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TRANSACTIONS

OF THE

~~SIXTH ANNUAL MEETING~~

OF THE

AMERICAN CLIMATOLOGICAL ASSOCIATION

HELD IN BOSTON, MASS.,

JUNE 25, 26, 27, 1889.

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MINUTES.

THE sixth annual meeting of the American Climatological Association was held in Boston, June 25, 26, and 27, 1889. Thirty-three members responded to their names, or were present at the subsequent sessions. The Association was called to order, with Dr. V. Y. Bowditch in the chair.

Dr. Bowditch read his Address as President, in which, after welcoming the members to Boston, he presented "Comparative Results in Ninety Cases of Pleurisy, with Special Reference to the Development of Phthisis Pulmonalis."

The following papers were read:

"The Summer Climate of Massachusetts Coast," by Dr. William D. Hodges; discussed by Dr. Knight.

"The Wakefulness of Neurasthenia as Affected by a Residence at the Seaside," by Dr. Daly; discussed by Drs. Solly, W. B. Platt, Bell, and Ford.

"The Mortality of Acute Lobar Pneumonia; a Study of All the Cases Treated at the Massachusetts General Hospital, from the First Case, in 1822, to the Present," by Drs. C. W. Townsend and A. Coolidge, Jr., Boston; discussed by Drs. V. Y. Bowditch, Loomis, H. I. Bowditch, Shattuck, Williams, W. B. Platt, Gihon, Denison, and Didama.

"Consumption as I Have Known It," by Dr. E. P. Hurd; discussed by Dr. Loomis.

"The Influence of Climate and Season upon the Manifestation of Normal and Abnormal Nervous Activity," by W. B. Platt; discussed by Dr. W. E. Ford.

FIRST DAY.—EVENING SESSION.

At 8 P.M., Dr. G. E. Abbot's paper, "The Basis of Rational Climatotherapy," was read by title in his absence. The paper on "Ocean Therapy," by Dr. A. L. Gihon, and that entitled "The Vital Statistics of Two Thousand Persons in an Ocean Atmosphere," by Dr. A. N. Bell, were discussed jointly by Drs. Didama, Loomis, and Kretzschmar. Dr. E. O. Otis, of Boston, presented "The Psychological Factor in Selecting a Climate for Invalids. Dr. John C. Munro's "Report of Cases of Acute Miliary Tuberculosis" was discussed by Drs. Loomis, Walker, and Williams; and the

paper on "The Pine Belt of New Jersey; a Region of Sandy Soil and Pine Forests," by Dr. I. H. Platt, was discussed by Dr. Kretzschmar.

Second Day.—Morning Session.

At 9.30 A.M., Dr. Henry I. Bowditch, by request, read a paper entitled, "Open-air Travel as a Cure and Preventive of Consumption; as Seen in the History of a New England Family," which was discused by Drs. Loomis, Denison, Solly, Hopkins, Leaming, V. Y. Bowditch, and Karl von Ruck.

Dr. Loomis followed, with a paper on "Rest and Exercise in Heart Disease," with remarks by Drs. Garland, Curtin, Ward, and Wilson.

The pathology, climatology, and treatment of hemoptysis, presented in three papers: "The Pathology of Hemoptysis from Chronic Pulmonary Disease," by Dr. G. M. Garland; "The Climatology of Hemoptysis in Chronic Lung Disease from an Etiological and Therapeutic Standpoint," by Dr. Roland G. Curtin; and "Treatment Other than Climatic of Hemoptysis in Chronic Pulmonary Disease," by Dr. James B. Walker, were discussed by Drs. Knight, Kretzschmar, Wilson, Loomis, Denison, and Williams.

Afternoon Session.

At 2 P.M. the business meeting was called to order, with Dr. Bowditch in the chair. Minutes of the last meeting were read and approved. The report of the Treasurer was read and audited.

Under the head of New Business, the Secretary presented the following for consideration at the next annual meeting:

Resolved, That the offices of Secretary and Treasurer be separated, and the Constitution so amended as to harmonize with this alteration.

The Committee on Nominations, consisting of Drs. Loomis, Garland, Geddings, Wilson, and Ford, presented the following list of officers for 1890:

President.—Dr. Charles Denison, of Denver, Col.

Vice-Presidents.—Dr. A. L. Gihon, U. S. N., and Dr. H. B. Baker, of Lansing, Mich.

Secretary and Treasurer.—Dr. J. B. Walker, of Philadelphia.

Council.—Dr. S. E. Solly, of Colorado Springs.

Representative to the Congress.—Dr. A. L. Loomis, of New York; Dr. F. Donaldson, of Baltimore, alternate.

On motion of Dr. Loomis, Dr. Henry I. Bowditch, of Boston, was unanimously elected an Honorary Member of the Association.

On the recommendation of Council, the following new members were elected:

Dr. A. Jacobi, New York.
Dr. L. F. Flick, Philadelphia.
Dr. H. M. Wilson, Tannersville, N. Y.

Dr. John C. Munro, Boston, Mass.
Dr. William D. Hodges, Boston, Mass.
Dr. A. Coolidge, Jr., Boston, Mass.
Dr. Karl von Ruck, Asheville, N. C.

In response to an invitation from our Colorado members, it was recommended to the Council to arrange for holding the next annual meeting in Denver, and at such time in the month of June as would harmonize with the meeting of the American Medical Association.[1]

On motion of Dr. Kretzschmar, it was decided that the Secretary shall furnish to the members, at the meeting for balloting, a list of candidates for membership, that such lists may be used in balloting.

On motion, the publication of the volume of *Transactions* was referred to the President and Secretary, after which the Association adjourned.

THIRD DAY.—AFTERNOON SESSION.

At 2.30 P.M. the regular session was opened by the reading of a paper entitled "Remarks on the Treatment of Pulmonary Phthisis," by Dr. J. C. Wilson, which was discussed by Drs. V. Y. Bowditch, Loomis, Flick, Knight, Denison, Didama, and H. F. Williams. The paper "Some Observations on the Causation and Treatment of Asthma," by Dr. Beverley Robinson, and that entitled "The Climatic Treatment of Bronchial Asthma," by Dr. F. I. Knight, were jointly discussed by Drs. Bosworth, Chapman and Ford.

The following papers were then presented:

"Institutions for the Treatment of Pulmonary Consumption in the United States," by Dr. P. H. Kretzschmar; discussed by Drs. Denison, Solly, Flick, Loomis, and V. Y. Bowditch.

"The Mineral Springs of Colorado," by Dr. Charles Denison.

"Notes on the Prevalence of Diphtheria at High Altitudes," by Dr. S. H. Chapman, was, at his own request, owing to the lateness of the hour, read by title only.

The members then adjourned to meet, a few hours later, at the Vendome, where they thoroughly enjoyed our annual banquet, which had been provided under the direction of Dr. G. M. Garland, Chairman of the Committee.

J. B. WALKER,
Secretary.

[1] The American Medical Association decided, a few days later, to meet in Nashville, instead of the Northwest, and hence fixed their meeting early in May. In response to an invitation from the Colorado physicians to meet in Denver in September, the Association will meet in Denver, September 2, 1890.

COMPARATIVE RESULTS IN NINETY CASES OF PLEURISY, WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF PHTHISIS PULMONALIS.

ADDRESS OF THE PRESIDENT.

BY VINCENT Y. BOWDITCH, M.D.,
OF BOSTON.

GENTLEMEN OF THE CLIMATOLOGICAL ASSOCIATION: It becomes my pleasant duty to bid you this year a cordial welcome to Boston, and to congratulate you upon the success and growth of our Society up to the present day. Excellent work has already been accomplished during the comparatively short existence of the Association, entitling it to an honorable position among the various specialist societies and giving us at the same time the hope of even better results in the future.

There are those who at first believed that the name of the Association suggested a too narrow field for it to continue to justify the hopes of its founders, and it has been gratifying to notice not only the changes of opinion in this respect but the cordial interest now shown by former doubters. Surely when it is fully understood that the object of our Society is not only the study of Climatology but that of Hydrology and of Diseases of the Chest, there can be no doubt as to the largeness of our field for study. It remains for us to show that by organization we can add valuable work to this special field of inquiry and prove that the American Cli-

matological Association is not merely a name but a power in the community.

With these introductory remarks I feel that I cannot do better than to follow the admirable course pursued by those who have preceded me in office, and give you the results of some special work which has interested me for several months past. I have entitled my paper, "Comparative Results in Ninety Cases of Pleurisy, with Special Reference to the Development of Phthisis Pulmonalis."

Having watched for some time the various opinions and discussions upon the question of the tubercular nature of pleurisy and its subsequent development into phthisis, and being struck with the widely varying ideas upon the subject, it occurred to me to make an investigation as to the results of the cases of pleurisy occurring in my father's practice from 1849 to 1879.

While recognizing the impossibility in any such investigation of determining absolutely the tubercular or non-tubercular character of pleurisy, I believed that I might at least be able to draw some practical conclusions from the subsequent history of these cases which would assist us in giving advice to our patients, and, more especially, prevent us from unnecessarily alarming ourselves, our patients, and their friends: a tendency which, I think, needs to be constantly guarded against in our profession, in the practice of which we are continually subjected to the influence of extreme views founded upon theories unsubstantiated by facts.

It may be well here to mention some of the various opinions held by eminent men in different countries as to the nature of pleurisy.

The most extreme views are held by Landouzy, of the Paris Faculty of Medicine, who believes that nearly all cases of pleurisy are tubercular in character, and that the so-called simple pleurisy from "taking cold" is a very rare thing, but that the great majority are the expression of an incipient

pulmonary tuberculosis which may appear at any subsequent time, even after an interval of many years. In this opinion he is enthusiastically followed by his pupils, J. R. G. Joanney[1] and Alois Mayor,[2] who give his views in two theses upon this subject.

Germain Sée[3] believes that three-fourths of all pleurisies are tubercular, and quotes Fiedler, who says that out of 112 pleurisies which were aspirated 21 recovered, 25 died of phthisis, and 66 recovered from the pleurisy, but were found to be victims of other tubercular diseases.

Strümpell[4] speaks of the simple fibrinous or exudative pleurisy as a rare disease, and says that the larger proportion are tubercular, and claims that even if phthisis appears several years later it is probably the result of pleurisy, and that only in comparatively few do the symptoms of acute tuberculosis or chronic phthisis appear as an *immediate* result.

Among those who take more moderate views may be mentioned Chauvet[5] and Rühle,[7] who go only so far as to say that many cases of pleurisy are probably tubercular in character.

Demandre[7] speaks of the deformity of the chest and development of bronchiectasis, and says that usually with pleurisy comes an interstitial pneumonia, but gives no statistics as to the frequency of subsequent phthisis.

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[1] Joanney (J. R. G.): "Du prognostic éloigné de la pleurésie." Thèse. Paris, 1881, p. 61, No. 230

[2] Mayor (Alois): "De l'avenir des pleurétiques." Thèse. Faculté de Méd. de Par., 1887, No. 181.

[3] Sée (Germain): Boston Med. and Surg. Journal, March 11, 1886.

[4] Strümpell: Text-book of Medicine (translation), p. 244.

[5] Chauvet: "De la pleurésie précédant le debût de la tuberculose pulmonaire." Lyon. méd., 1885. xlix. 111–114.

[6] Rühle: Ziemssen's Handbook of Medicine (translation), vol. v. p. 500.

[7] Demandre: "Des consequences et definitives des épauchements pleurétiques sereux, etc. Rec. de mém. de méd. . . . mil, Paris, 1881, xxxvii. p. 537.

Gerhardt,[1] in 1879, speaks of pleurisy as often preceding phthisis, but also gives no statistics.

Niemeyer[2] classifies various forms of pleurisy, and is evidently far from the opinion advanced by Landouzy.

Anstie[3] says: "It is now well established, not merely that pleurisy occurs in phthisis, but that pleurisy can set up true tuberculosis even in previously healthy persons."

Bartholow[4] speaks of the importance of recognizing pleurisy as a frequent cause of phthisis from causing tubercular deposit.

Loomis,[5] while recognizing the existence of tubercular pleurisy, is very far from believing that all cases are of tubercular nature, or that they will be followed by phthisis.

Sir Andrew Clark[6] recognized the fact that phthisis is by no means an infrequent sequence of pleurisy, but evidently is far from believing in the tubercular origin of all cases, and in these views he is supported by C. Theodore Williams,[7] who, in the second edition of his book on "Pulmonary Consumption," says on page 24: "Not uncommonly the friction sound of dry pleurisy in the supraclavicular region is the first sign of the presence of tubercle at the apex of the lung. . . . It is generally noted that the lungs are the first organs affected (in miliary tuberculosis), and it is extremely rare for tubercle to exist in any organ without also being present in the lung." On page 49 he says: "Chronic pleurisy, by crippling the movements of the lungs and thus promoting congestions and exudations, prevents the proper expansion of the alveoli,

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[1] Gerhardt: Wiener med. Wochenschrift, No. 40, 1879.
[2] Niemeyer: Text-book of Practical Med., vol. i. p 249.
[3] Anstie: Pepper's System of Med., vol. iii. p. 513.
[4] Bartholow: Pepper's System of Med., vol. iii. p. 513.
[5] Loomis: Practical Medicine, 1884, p. 186.
[6] Clark (Sir Andrew): Lancet, 1885.
[7] Williams (C. Theodore): Pulmonary Consumption, 1887. P. Blakiston & Son, Philadelphia.

and thus affords a nidus for the bacillus;" and on page 271: "There are two principal modes of origin of fibrosis (that is, non-tubercular phthisis), firstly, *from attacks of pleurisy*, and pleuro-pneumonia, etc."

F. C. Shattuck,[1] in an article on pleurisy, for the *Reference Handbook of the Medical Sciences*, says: "Whatever views one may hold as to the frequency of primary effusion as an independent disease, it cannot be denied that recovery absolute and permanent is common enough;" and, further on, adds: "In view of the fact that tuberculosis does develop in cases of this class after an interval which may be long, we cannot regard them with quite the same equanimity as we are justified in preserving in cases where rational and physical signs alike disappear."

B. F. Westbrook[2] and Herman F. Vickery,[3] in papers published within the last two years, give results of cases of pleurisy which have subsequently become phthisical, and lay stress upon the importance of watching carefully the convalescence of pleurisies in all cases.

Strongly opposed to the views of Landouzy may be mentioned Theodore Dumin,[4] of Warsaw, who expresses the greatest astonishment at the former's conclusions, and claims that true tubercular pleurisy, where miliary tubercles begin on the pleura, is a rare disease. He believes, on the other hand, that most pleurisies are the result of pulmonary tubercle, which cannot be detected by physical signs, and that the prognosis of the latter form depends upon

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[1] Shattuck (F. C.): Reference Handbook of Medical Sciences. "Pleurisy."

[2] Westbrook (B. F.): "Pleurisy as a Predisposing Cause of Phthisis Pulmonalis." New York Med. Journ., 1888, xlvii. 617.

[3] Vickery (H. F.): "Pulmonary Tuberculosis as a Sequel to Ordinary Pleurisy with Effusion." Med. and Surg. Journ., 1887, cxvii. 521.

[4] Dumin (Theodore): "Observations sur les rapports qui existent sutre la pleurésie et la tuberculose." Gaz. Heb. de Méd., Paris, 1887, 2 s. xxiv. 295.

the course of the primary disease in the lung, which can be healed; views which seem to me as theoretical and difficult of proof as those he criticises.

A strong practical refutation of Landouzy's views appears in a paper by Blachez,[1] a man evidently of large practical experience, who scouts the idea of the tubercular origin of all pleurisies, and cites a number of cases classed as simple pleurisy which have never in later years developed the least pulmonary trouble. He also makes special mention of an epidemic of "pleurésie à figore," which occurred in the army many years ago, the subjects of which he has kept under supervision since, not a single symptom of pulmonary trouble having appeared in any one of them.

E. Martel,[2] of Saint-Malo, comes to the same conclusion as Blachez, and regards as ridiculous the opinion that nearly every case of pleurisy is tuberculous.

Austin Flint,[3] in an analysis of 47 cases, states that in 3 the subsequent development of phthisis was probable, although not demonstrated, and in one case only was the occurrence of this disease as a sequel certain.

Of 53 cases reported by Blakiston,[4] not one became phthisical during several years after recovery from pleurisy.

Thus we have specimens of the widely varying opinions among different observers.

In obtaining my results I have addressed the following set of printed questions to the patients or their friends, answers having been frequently obtained from physicians, who have known the patients, or from town clerks:

1. Where have you been living since you consulted Dr. Bowditch?

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[1] Blachez: "La nature de la pleurésie." Gaz. Heb. de Méd., Paris, 1886, 2 s. xxiii. 662.

[2] Martel (E.): Gaz. Heb. de Méd,, 1886, 2 s. xxiii. p. 699.

[3] Flint (Austin): Pepper's Hand-book of Medicine, p. 394.

[4] Blakiston: Ditto.

2. What has been your occupation?
3. Has your general health since then been good, bad, or indifferent?
4. Have you been subject to cough since?
5. Have you had any lung trouble since, and if so, how long after you last saw Dr. Bowditch did the cough begin?

Should the patient be no longer living, will the friends kindly answer the following questions?

1. How long after the patient saw Dr. Bowditch did he (or she) die?
2. What was the cause of death?
3. Did the patient recover entirely for any length of time after last consulting Dr. Bowditch?
4. Was he (or she) subject to cough?
5. If lung trouble caused the death, about how long after seeing Dr. Bowditch did the cough begin?

If any reputable physician saw the patient at any time, please give his name and address; and if the physician has removed or died, please state, if you can, what he thought the patient died of.

Although the number of cases in which I have been able to collect satisfactory data is small in comparison to the number addressed, yet considering the lapse of time and the frequent uncertainty of address, I am gratified at having received replies from so many.

In analyzing the cases I have attempted no distinct classification into so-called "dry pleurisies," pleurisies with serous effusion and empyemas, but have put them all together, my endeavor having been to cast out every case in which there was the least evidence, upon careful examination, of co-existing pulmonary disease (for we all know that pleurisy is a frequent accompaniment of phthisical trouble).

Let me say, also, that with our knowledge that tubercular disease can arise and be checked never to reappear, I should not be so foolishly illogical as to attempt to prove in any given case of pleurisy that because of the subsequent health of the patient it was, therefore, of non-tubercular character. It would, moreover, be a just criticism to speak of the possibility of preëxisting disease of the lung in some

of the cases mentioned, even when the most careful examination failed to reveal any such condition.

Any such possible error is only an example of the extreme difficulty of arriving at precise conclusions in such questions.

My aim, therefore, is simply to show, as far as possible, how many of the patients have regained and kept their health and how many have succumbed later to phthisis or other probably tubercular disease.

For the sake of convenience, I have divided the thirty years from 1849 to 1879 into decades.

During the first decade, from 1849 to 1859 inclusive, I have the records of 30 patients.

Of these, 11 are now (1889) living, and have all been well, except one who has been subject to cough since at times; 17 are dead. In 2 the condition today is not known, although in one case phthisical symptoms developed fourteen years after the examination, and is classed accordingly; and the other, seven years after the first illness, showed "perfect percussion note and respiration everywhere."

Of the 17 who died, 12 died of phthisis; 5 died from other causes:

No. 1, of chronic rheumatism thirty-five years later, aged eighty-five.

No. 12, from suicide during melancholia twenty-five years later, aged thirty, in the interval having been in robust health.

No. 14, from angina pectoris five years later aged fifty-eight, having been well in the interval.

No. 16, from "acute gastritis" thirty-one years later, aged sixty-nine, no evidence of pulmonary trouble showing itself, although rather delicate.

No. 3, from "inflammation of the bowels" twenty-two years later, aged forty-one, no apparent pulmonary trouble having been present, although after great privations in army life a cough appeared for some time, and then disappeared entirely.

Adding to the number now living, 11, the 1 whose present condition is unknown, but who seven years after the first examination showed a perfectly

TABLE OF NINETY CASES OF PLEURISY SHOWING THE ULTIMATE RESULTS.

First Decade, from 1849 to 1859 inclusive.

No	Sex.	Age	Date	Disease.	Result.	Cause of death.	No. of years between examination and death	Age in 1859.	Age at time of death.	Remarks
1	M.	42	1849	Acute pleurisy (left).	Dead.	Chronic rheumatism.	35	...	77	
2	M.	32	1849	Pleurisy (left).	Dead.	Probably phthisis.	3	...	35	
3	M.	19	1853	Pleurisy (right), tapped.	Dead.	"Inflammation of bowels."	22	...	41	At one time cough, which disappeared again.
4	M.	42	1853	Pleurisy (right), tapped.	Dead.	Phthisis.	11	...	53	
5	M.	24	1853	Empyema (right), tapped.	Living.	.....	.....	60	.....	"Health good since."
6	F.	33	1854	Pleuritic effusion (right).	Living.	.....	.....	68		"Health good since."
7	M.	20	1854	Pleurisy (left).	Living.	.....	.....	55	.....	"Well since."
8	F.	...	1854	Acute empyema (left), two weeks.	Dead.	Phthisis.	18	...	Well advanced.	Perfectly well up to two weeks before first visit.
9	M.	14	1855	Pleuritic effusion (right).	Dead.	Phthisis.	6	...	20	Perfectly well apparently up to a short time before death, then sudden decline.
10	M	21	1856	Pleurisy (right), following fall.	Living.	.....	.....	54	.....	"Well since."
11	M	52	1856	Pleuritic effusion (right), after swallowing melon seed.	Living.	.....	.....	85	.....	"Well since."
12	F	5	1856	Empyema (left); permanent opening.	Dead.	Melancholia; suicide?	30	...	35	Perfectly well as far as lungs were concerned.
13	M.	25	1856	Pleurisy, convalescent at home.	Living.	.....	.....	58	.....	"Well since."
14	M.	53	1856	Pleuritic effusion (right).	Dead.	Angina pectoris	5	...	58	No return of trouble
15	M.	Adult	1856	Pleurisy (right).	Dead.	"Quick consumption."	2 mos	...	Adult ?	
16	M.	38	1856	Chronic pleurisy (right).	Dead.	Acute gastritis.	31	...	69	"Not subject to cough, but had to be careful."
17	M	38	1857	Pleurisy (left).	?	.....	.....	...	.....	In 1853 (7 years later) "auscultation and percussion perfect." Further history not known.
18	M.	...	1857	Pleuritic effusion (right).	Dead.	Phthisis.	7	...	Adult ?	"Failed from commencement."
19	M.	47	1857	Pleuritic effusion (right).	Dead.	Phthisis.	.....	...	48+	"Crackling in left apex a year later."
20	F.	32	1857	Pleurisy (right).	Dead.	Phthisis.	7	...	39	
21	M.	26	1857	Pleurisy (right)	Dead.	Phthisis.	2	...	28	Ill a few months before visit.
22	M.	28	1857	Pleurisy (right).	Living.	.....	.....	60	.....	"Fair health; subject to cough, which is better, but never cured."
23	F.	13	1857	Pleurisy (left).	Living.	.....	.....	45	.....	"Well since."
24	M.	About 30	1857	Pleurisy with effusion (right).	Living.	.....	.....	About 62	.....	"Well since."
25	M.	12	1858	Pleurisy (left).	Living.	.....	.....	43	.....	"Well since."
26	M.	...	1858	Pleurisy (right).	Living.	.....	.....	...	.....	"Well since."
27	M.	30	1858	Pleurisy (right).	Dead.	Phthisis.	15	...	45	No evidence of pulmonary trouble until ten or twelve years later.
28	M.	24	1859	Pleurisy (left) at one year before.	Dead.	Phthisis.	2	...	26	
29	M.	25	1859	Pleuritic effusion (right).	Dead.	Phthisis.	7	...	32	
30	F.	47	1859	Pleurisy (right) sixteen years before.	?	Probably phthisis.	.....	...	47+	Signs of phthisis began about 14 years after attack of pleurisy.

Second Decade, from 1860 to 1869 inclusive.

31	M.	39	1860	Pleurisy (left).	Living.	.....	.....	68	.....	"Well since."
32	M.	28	1860	Pleurisy (right).	Dead.	Intermittent fever and chronic diarrhœa.	2	...	30	Contracted intermittent fever in army in 1861; had had pleuritic pains several months before examination.
33	F.	37	1860	Pleurisy with effusion (left).	Living	.....	.....	66	.....	"No lung trouble since."
34	M.	25	1860	Pleurisy (right).	Dead.	Phthisis.	3½	...	28½	Health never good after first attack.
35	M	60	1860	Pleurisy with effusion (right).	Dead.	Chronic nephritis.	20	...	80	
36	M.	35	1861	Pleurisy (left).	Dead.	Phthisis.	18	...	53	"In 1876 evident tubercular disease of left apex."
37	M	32	1866	Pleurisy with effusion (left), tapped.	Dead.	Phthisis.	2	...	34	
38	M.	24	1866	Pleurisy (left).	Living.	.....	.....	42	.....	"Well since."
39	M	30	1861	Pleurisy (right).	Dead.	Phthisis.	12	...	42	"Recovered entirely for 6 years."
40	F.	7	1861	Empyema (right); tapped.	Dead.	Acute mania.	32	...	30	Had melancholia, but otherwise had been picture of health, lungs perfectly sound.
41	M.	54	1866	Pleurisy with effusion (left), tapped.	Dead.	Phthisis.	5	...	59	"Never fully recovered."
42	M	18	1867	Pleurisy (right).	Living.	.....	.....	40	.....	"No lung trouble since."
43	F.	17	1867	Pleurisy (left).	Living.	.....	.....	39	.....	"Excellent health since."
44	M.	50	1867	Pleurisy (left).	Dead.	"Bronchial consumption," phthisis.	13	...	63	"Never entirely recovered, subject to cough."
45	M.	42	1867	Pleurisy (right).	Living.	.....	.....	64	.....	"Health good since, delicate."
46	M	28	1868	Pleurisy with effusion (left); tapped.	Dead.	Phthisis.	2	...	30	
47	M	22	1863	Pleurisy (right).	Living.	.....	.....	43	.....	"Indifferent health, no cough since."
48	M	24	1869	Pleurisy with effusion (right), tapped.	Dead.	Phthisis.	1	...	25	
49	M	43	1869	Pleurisy (left).	Dead.	Probably phthisis.	4?	...	47+	Two or three years later "moist rales in left back. Losing strength."

Third Decade, from 1870 to 1879 inclusive.

50	M.	49	1870	Pleurisy (left).	Living.	.....	.....	68	.....	"Well."
51	M.	48	1870	Pleurisy (right).	Dead.	"Heart disease."	16	...	64	"Died suddenly after two days' illness. Not subject to cough."
52	M.	22	1870	Pleurisy (left).	Living.	.....	.....	41	.....	"No lung trouble." Living in Minneapolis.
53	M.	63	1870	Old pleurisy (right) ten years before.	Dead.	"Heart disease."	?	...	63+	Date of death not to be ascertained.
54	M.	4	1870	Empyema (right); tapped.	Living.	.....	.....	23	.....	Theological student. Well
55	M.	34	1871	Old pleurisy (right) one year and a half before	Dead.	Phthisis.	2	...	36	Died, of "effects of pleurisy, in Colorado."
56	M.	36	1871	Chronic pleurisy (right)	Living.	.....	.....	54	.....	"Indifferent health. Subject to cough since."
57	M.	32	1871	Pleurisy (left).	Dead.	Phthisis.	3 mos.	...	32	
58	M.	37	1872	Pleurisy (left).	Living.	.....	.....	54	.....	"Well since."
59	M.	15	1872	Pleurisy (right) two years before.	Living.	.....	.....	32	.....	Well since.
60	M.	10	1870	Pleurisy (left).	Living.	.....	.....	29	.....	Well since.
61	M.	59	1872	Pleurisy (left).	Dead.	Heart disease	13	...	72	
62	M.	51	1872	Pleurisy (right).	Dead.	Phthisis.	11	...	62	"Never recovered from first attack."
63	M.	12	1872	Pleurisy (right).	Living	.....	.....	29	.....	"Health good since."
64	M.	39	1873	Pleurisy with effusion (right); tapped.	Living.	.....	.....	54	.....	Well since.
65	F.	26	1873	Pleurisy with effusion (right), tapped.	Dead.	Acute congestion of lungs with phthisis.	10	...	36	"Good health up to within a year or two of death."
66	M.	46	1873	Pleurisy (right).	Living.	.....	.....	62	.....	Well.
67	M.	56	1873	Pleurisy (left).	Dead	Apoplexy following Bright's disease.	12	...	68	Perfectly well as far as lungs were concerned.
68	F.	32	1873	Pleurisy (right).	Dead.	Phthisis.	7	...	.....	"Never well afterward."
69	M.	32	1873	Pleurisy with effusion (right); tapped.	Living.	.....	.....	48	.....	"Robust health since. One hemorrhage six years later."
70	M.	31	1873	Pleurisy with effusion (right).	Dead.	"Chronic pneumonia."	3	...	54	
71	M.	22	1873	Pleurisy (right).	Dead.	Phthisis.	Few yrs.	...	25+	Went south, and died not known exactly when.
72	F.	40	1873	Pleurisy (right).	Dead.	Intestinal obstruction.	11	...	51	Recovered entirely from pleurisy, and was unusually well up to death
73	M.	32	1874	Pleurisy (right).	Living	.....	.....	47	.....	"Well since, with exception of pneumonia in 1885."
74	M.	34	1874	Pleurisy (right).	Living.	.....	.....	49	.....	"Well since."
75	M	34	1874	Pleurisy with effusion (right) tapped.	Living.	.....	.....	49	.....	"Well since."
76	M	48	1874	Pleurisy with effusion (left), tapped.	Dead.	"Paralysis."	3	...	51	
77	M.	16	1874	Empyema (left), permanent opening	Living.	.....	.....	31	.....	After two years recovered completely, and is perfectly well.
78	M	29	1875	Old pleurisy (right), *twelve years previously*	Living.	.....	.....	43	.....	"Health good since. Practising law."
79	M.	10	1875	Pleurisy (left).	Living.	.....	.....	24	.....	"No lung trouble since. Well.
80	F.	52	1875	Pleurisy (right).	Living.	.....	.....	66	.....	"General health good. Thinks right lung has never regained former condition."
81	M.	43	1875	Pleurisy with effusion (left).	Dead.	Phthisis.	3	...	46	"Improved, but had hemorrhage one year later."
82	M	46	1875	Old pleurisy (left) six month previously.	Living.	.....	.....	60	.....	"Good health. No lung trouble since."
83	M.	29	1876	Empyema (right), tapped several times.	Living.	.....	.....	42	.....	"Has felt perfectly well since."
84	M.	43	1876	Old pleurisy (left) three months previously.	Living.	.....	.....	56	.....	"Two years before he regained health, which has been good since. No cough.
85	I	61	1877	Old pleurisy (right) *twenty-five years before*	Living	.....	.....	73	.....	"Good health since
86	M.	20	1877	Empyema (right), tapped and permanent opening	Living.	.....	.....	32	.....	Health good since opening closed one year after operation.
87	F.	15	1877	Pleurisy with effusion (right) nineteen mos. standing. Later empyema: permanent opening.	Living	.....	.....	30	.....	Opening in side secreted pus still, and patient has had cough for three years, probably phthisical.
88	M.	32	1878	Pleurisy with effusion (left) *nine years before*	Dead.	Phthisis.	1	...	53	
89	M	27	1878	Pleurisy with effusion (right), tapped. Three months later pleurisy left).	Living	.....	.....	38	.....	Perfectly well since. Respiration in both lungs perfect upon examination 1881.
90	F.	23	1878	Acute circumscribed pleurisy.	Living	.....	.....	37	.....	Strong healthy woman, four children. No cough since.

normal condition, we have 12 who recovered entirely, or 40 per cent.

Adding to those who died of phthisis, 12, the 1 who developed phthisis fourteen years after the first examination, we have 13, or 43⅓ per cent.

Died from other causes, 5, or 16⅔ per cent.

In the second decade, from 1860 to 1869 inclusive, I have records of 19 cases.

Of these, 7 are now living, 5 having been in robust health since, 2 somewhat delicate, but without apparent pulmonary trouble.

12 are dead: 9 have died of phthisis, or have developed symptoms since; 3 have died from other causes. One (No. 32) died from "intermittent fever and chronic diarrhœa contracted in the army" two years later, aged thirty (questionable tubercular trouble). No. 40 died of acute mania twenty-three years later, aged thirty, the intervening period having been one of robust health.

Living = 7, or 36 + per cent.

Dead from phthisis, or with phthisical symptoms now = 9, or 47 + per cent.

Dead from other causes = 3, or 16 + per cent

Of No. 32 it should in fairness be noticed that the question of tubercular trouble in the intestines is raised. If such was the case, the original pleurisy was very possibly tubercular, which would alter the percentage slightly.

In the third decade, from 1870 to 1879 inclusive, I have the records of 41 cases.

Of these, 25 are now living without pulmonary symptoms, of whom 23 have been in good health since; 2 are not robust.

15 are dead: 9 have died from phthisis, and 1 (No. 87) is now phthisical = 10 phthisical; 6 have died from other causes: 3 (Nos. 51, 53, and 61) from heart disease, all over fifty years of age, and from ten to fifteen years after examination; 1 (No. 67) from apoplexy following Bright's disease twelve years later, aged sixty-eight, with apparently perfect health in the interval; 1 (No. 72) from "intestinal

obstruction" eleven years later, aged fifty-one, perfectly well before; 1 (No. 76) from "paralysis" three years later, aged fifty-one.

Living without pulmonary symptoms, 25 = 61 + per cent.

Dead from phthisis, or now having symptoms of phthisis, 10 = 24 + per cent.

Dead from other causes, 6 = 14 + per cent.

In comparing the percentage of mortality from phthisis in the cases from 1870 to 1879 inclusive with that of the cases of the first decade, 1849 to 1859, we find the percentage 24 per cent. in the former as against 43⅓ per cent. in the latter, and against 47 + per cent. in the second decade, from 1860 to 1869 inclusive.

In attempting to explain this difference in percentage we must not lose sight of the fact of the possibility of the development of phthisical symptoms later in those of the third decade who now seem perfectly well. In one case reported by Mayor phthisical symptoms did not appear until twenty-four years after the pleuritic attack which occurred during childhood, this being, so far as we know, the longest interval spoken of, the patient, a comparatively young woman, succumbing to pulmonary disease—whether a result, as Mayor would have us believe, of the previous pleurisy, or not, being to my mind most questionable.

The fact remains that long periods of perfect health do occur between the onset of the two diseases, and we must, therefore, take this into account in comparing the later with the earlier decades.

In looking carefully over the tabulations, I find, in the first decade, among the deaths from phthisis, the following points:

1 patient died eighteen years after the pleuritic attack.

3 patients died between ten and fifteen years after the pleuritic attack.

9 patients died in seven years or less after the pleuritic attack.

In the second decade, 1860 to 1869 inclusive:

1 patient died in eighteen years after the pleuritic attack.

2 patients died between ten and fifteen years after the pleuritic attack.

6 patients died under five years after the pleuritic attack.

In the third decade, from 1870 to 1879 inclusive:

1 patient died eleven years after the pleuritic attack.

1 patient died ten years after the pleuritic attack.

7 patients died under seven years after the pleuritic attack.

1 patient, still alive, developed phthisical signs about ten years later than the pleuritic attack.

Thus we see that in the first two decades about two-thirds of those who died of phthisis succumbed in seven years, or less, while about one-third lived from ten to eighteen years after. If we adopt the same ratio for the third decade, we have already passed the period (ten years) during which two-thirds of those who developed phthisis succumbed, and even supposing the possibility of a later appearance of phthisis in the remaining one-third, it still leaves the percentage of mortality from pulmonary disease from ten to fifteen per cent. less than in the previous decades.

Should this result be found similar to others in the future, it would give us ground for believing that modern methods of treatment in these cases are productive of better results than in the past. While not attempting to prove this fact, of course, by such tabulations, and granting that it may be mere coincidence, it is at least worthy of remark, and certainly points favorably toward the greater attention paid in later years to the after-treatment of pleurisies, by proper expansion of the chest, outdoor exercise, good food, etc.

In connection with the preceding, and as opposed to the extreme views mentioned before, I wish before closing to lay special stress upon this point, viz.,

that I consider as most unwarrantable the assertion, that because phthisis develops in any subject who, several years before, has had pleurisy, the two diseases in every case are necessarily dependent upon each other, the intervening period having been one of robust health.

As an example, let me cite the following case:

A man, now thirty-eight years of age, eleven years ago developed a sudden acute pleurisy, with effusion on the right side, for which he was aspirated by my father, after which he recovered quickly, but three months later was attacked with similar symptoms on the left side, for which he entered the City Hospital, where the fluid gradually disappeared without aspiration. In a few months he entirely regained his health, and has been perfectly well ever since, pursuing his occupation as conductor on one of the railroads near Boston. I examined him this spring, and found him a man of robust health, of good color, the chest full and well formed, the percussion and auscultation on both sides absolutely perfect without a trace of his former pleuritic trouble.

Now even supposing the possibility of a subsequent development of phthisis in this man, should we be justified in saying that the double-sided pleurisy was the first sign of the pulmonary disease which appears in later years? Most assuredly not, it seems to me; on the other hand, why is it not perfectly possible in such cases that the subsequent pulmonary disease is an independent process arising in precisely the same way as in other cases in which no history of a former pleurisy can be obtained?

This and similar cases where there is a long period of perfect health, make me think that the advocates of the certain connection between the two diseases and of the tubercular nature of all pleurisies are drawing conclusions too hastily.

The results of this investigation show us at least:

First. That whether we can prove absolutely, by such statistics, that all pleurisies are tubercular or not, yet a large percentage of these patients who

were afflicted with pleurisy, often in apparently chronic forms, recovered their health and have never had any recurrence of the original trouble nor development of subsequent pulmonary or otherwise tubercular trouble.

Second. That while undoubtedly there are many cases in which an attack of pleurisy is followed within a comparatively short space of time by pulmonary trouble; and, therefore, special care should be taken of the patient during convalescence from the former disease, yet we are not justified in giving such gloomy prognosis as we should be inclined by accepting the extreme views held by Landouzy and his followers.

To give hope and courage to patient and friends should be the first effort of every physician.

Let us be doubly on our guard then, while looking for the truth, in accepting conclusions founded upon insufficient evidence, lest we run the risk of hindering what we most desire, viz., the recovery of our patients.

DISCUSSION.

Dr. F. C. Shattuck, of Boston: I think it is an extremely interesting thing, but I cannot on the spur of the moment absorb it sufficiently rapid to give out anything.

Dr. F. I. Knight, of Boston: There is only one point which I would like to call attention to, and I take this opportunity to do what I meant to do at some time during the meeting, and that was, to try to impress upon the members of this Association the idea that New England is not such a bad place during July and August for our patients to return to. I find great difficulty, in sending patients away, in ever getting them home again; and I think this record of facts here given ought to convince the gentlemen that they can risk their patients coming home for two months in midsummer.

REPORT OF TWENTY-FOUR CASES OF ACUTE MILIARY TUBERCULOSIS.

By JOHN C. MUNRO, M D.,
OF BOSTON.

The following analysis of twenty-four cases of acute miliary tuberculosis of the lungs has been made in order to furnish, if possible, some clews toward the detection of a disease that not infrequently bewilders the most careful practitioner. The cases have been taken from the records of the Boston City Hospital, and it is to the courtesy of the members of the staff that I owe the pleasure of presenting this brief consideration. For the use of some valuable private notes made on a number of the patients by Dr. Samuel Delano I feel greatly indebted also.

All the cases were fatal, occurring within the last five years, and only those in which a post-mortem examination was made have been chosen.

The number is too small to attempt to draw percentage conclusions, and some factors, generally considered of importance, have been passed over because of insufficient data.

Fourteen patients were males, with an average age of thirty-eight years, that of the females (not including one child two and a half years old) being only thirty-two years. The oldest, a man, was sixty-five years of age, while eight were between the ages of forty and sixty years. Over half were born on or near our eastern coast; two were negroes.

The majority were ill in February, March, or April; their occupations were of various kinds and apparently had no causative influence.

Only three gave a phthisical family history; in

twelve it was not phthisical, while in nine no history could be obtained.

Three-fourths of all the patients had always been well up to the time of the present illness, and although in thirteen cases the autopsy revealed a chronic tuberculosis in addition to the acute miliary process, yet of this group only a single patient had given a history of having suffered from phthisis; in fact, the remainder had always been looked upon as healthy. Even though there was a history of cough for one or more months in quite two-thirds of the cases, it was noted as being slight, with a muco-purulent expectoration and had excited no alarm except in one instance where several attacks of profuse hæmoptysis had occurred. Severe cough was recorded in two cases, but in each it had begun less than a month before admission to the hospital.

Among the exciting causes might be mentioned the following: overwork and exposure in a damp cellar; several weeks of hard drinking, with but little food; partial asphyxiation from drowning; measles, scarlatina, whooping-cough with measles, and vaccination each in one case.

The clinical diagnoses varied considerably, from tubercular meningitis in eight cases, to exhaustion, typhoid, bronchitis, etc. Two patients died immediately after admission to the hospital, so that very little history and no physical examination could be obtained.

About one-third of the cases gave a clear history of a marked chill ushering in the disease; a few more complained of feverishness and malaise, while headache, naturally frequent in those with a meningeal affection, was pronounced in a few others.

Loss of flesh, strength, and appetite, wherever noted, came on rapidly and was very marked. Likewise night-sweats, though recorded too few times to be of much value, were always profuse.

In one-half of those cases where derangement of the menstrual function could serve as an indication of any general trouble no record is made, but in the

other half all the patients had had amenorrhœa for from one to four periods.

In the two cases that had had hæmoptysis an old cavity was found in the lungs at autopsy.

The condition of the bowels gave no light in making a diagnosis; cases with tuberculous ulceration of the intestines were apparently affected neither one way nor the other by the lesion.

The tongue was generally coated and dry; in a few cases cracked.

The temperature in a majority of the cases at entrance was 100° F. or over, the pulse 100 or over, and the respiration 28 or over; of the course of each throughout the disease mention will be made later.

In seventeen cases an examination of the urine was made, and albumin, generally a slight trace in amount, was found in eleven. Of the latter, autopsy showed an acute tuberculosis of the kidneys in over seventy per cent., whereas of the six cases in which albumin was not found, only three (fifty per cent.) had a similar lesion. Notwithstanding these numbers are too small to warrant definite conclusions, they at least suggest that there may be some connection between the two conditions.

The eyes were examined in four patients; one, with sarcoma of the hypophysis had atrophy of both disks; two had a double optic neuritis, and, finally, one had tubercle of the choroid. Considering the importance that some writers attach to this latter condition, it is unfortunate that more cases were not examined with the ophthalmoscope.

Examination of the heart afforded no assistance in diagnosis so far as the recorded results show.

The signs obtained from careful physical examinations of the lungs, though often confusing and misleading, apparently show an undercurrent of certain definite characteristics. The disease is of such a nature, and the lungs are so frequently the seat of some other morbid process that only examinations most carefully made during life, and compared topographically with the lesions found after

death, can establish what signs belong properly to an acute miliary infiltration. A few cases carefully studied in this way would help wonderfully to clear up certain obscure points. Unfortunately, from the predominance of some symptom, or set of symptoms, pointing elsewhere than to the chest, the lungs are not infrequently hastily examined merely to exclude a more definite lesion, like lobar pneumonia, and are not again considered during the course of the disease. However, in the present group of cases certain characteristics seemed present so far as could be learned from the recorded examinations, many of which were very carefully and thoroughly made.

In the cases where there was a chronic in addition to the acute tuberculous process—that is, in the acute-chronic cases, percussion showed that dulness was not necessarily confined to the region of chronic infiltration, but might be extended to a considerable distance beyond, and be repeated in some other area where no chronic process existed. In a few simple acute cases where no dulness is recorded, it was probably overlooked; in the remainder it varied from a feeling of lessened elasticity to a moderate degree of dulness in localized regions over a single lobe or even over an entire lung.

In nearly every case where fremitus or vocal resonance was increased, the effect of a chronic induration could not be ruled out.

The respiratory murmur in simple acute cases was, for the most part, indistinct, harsh, with a high-pitched inspiration and a lower-pitched, prolonged expiration. In acute-chronic cases all qualities are recorded, but in the majority it was feeble in intensity, harsh, with high-pitched inspiration, and a prolonged expiration grading from a lower pitch to a bronchial quality.

The râles heard in simple acute cases were almost invariably few in number, fine in quality, dry, and sometimes moist, high-pitched, and less often low-pitched (none of the latter being moist). Often several kinds were to be heard in the same patient.

In acute-chronic cases they were coarser in type, more numerous, and more moist, besides being accompanied by those of a fine dry or a fine moist character. In one or two cases, even with a chronic process, only a few râles of any kind were recorded.

The clinical history of the cases while under treatment can be briefly summarized. They rapidly lost strength and flesh, delirium or coma soon appearing in nearly every case. The pulse steadily increased in frequency and decreased in strength. The respiration, somewhat rapid at entrance, increased in frequency, becoming more and more shallow, and often irregular with increasing cyanosis. A few developed abdominal tympanites; a few, pain in the chest. Even though in several cases a slight amelioration intervened for a few days, the course was steadily and rapidly down-hill to death, and no treatment seemed to be of any avail in checking its progress.

The clinical charts showed nothing very significant, except, perhaps, from a negative point of view. The temperature ranged from 101° to 103° F., on the average, making daily excursions of one or two degrees, while very rarely was it higher in the morning than at evening; it seldom fell below the 100° line, and rarely rose as high as 104°. The pulse rarely fell below 100, and often rose to 140 beats or more; its line steadily ascended while the daily excursions were not very marked. The line of respiration followed very closely that of the pulse, both frequently being high without any corresponding elevation of temperature. In no case was there cessation of fever before death.

The duration of the fatal illness, reckoning from the initial chill or other marked symptom, averaged thirty days; in uncomplicated acute cases, where the beginning could be more accurately determined, the duration was shorter by about four days. The average length of stay in the hospital, excluding the two cases that died at entrance and one previously under treatment for measles, was fifteen days, so that they

were all well developed before any systematic treatment had been undertaken.

The following complications of cases while in the hospital are important: One woman, fifty-eight years old, had sarcoma of the hypophysis with a few cerebral symptoms; one, supposing herself pregnant, had just attempted abortion, and during her stay was attacked with facial erysipelas; one man had general psoriasis, and one had probably an acute tubercular pleuritis.

The post-mortem examination in every case showed an acute miliary tuberculosis of the lungs, and, so far as could be judged, it was the important, or one of the important, pathological conditions. As mentioned before, thirteen showed in addition some degree of chronic tuberculous process going on, often with cavity formation. Where a focus for general infection did not exist in the lungs themselves, one could always be found in one or more groups of lymphatic glands. In thirteen cases, divided almost equally between the acute and acute-chronic, there was an acute tuberculosis of the meninges, causing so marked symptoms during life that the diagnosis was strongly influenced. Next to the lungs, the following organs were invaded by tubercles: the spleen in 15 cases, the kidneys in 14, the meninges in 13, various groups of lymphatic glands in 11, the intestines (with ulceration) in 10, the liver in 9, the pleura in 7, the pericardium and peritoneum each in 3, the bladder, diaphragm, and a supra-renal capsule, each in 1.

In conclusion, these cases would seem to indicate that an acute pulmonary tuberculosis should be suspected when the following indices are present (the existence of other pathological conditions in the lungs giving rise to characteristic signs and symptoms that ought not entirely mask those under consideration): Sudden severe illness, ushered in with a chill, in a person previously healthy or with a history of chronic phthisis; slight cough and expectoration, no hæmoptysis, marked loss of flesh and strength;

loss of elasticity, or a slight dulness over part or the whole of a lung or surrounding a limited area of marked dulness; indistinct, harsh respiration, with high-pitched inspiration and prolonged low-pitched expiration; a few scattered fine dry or fine moist râles, generally high-pitched; a rapid, weak pulse, with quickened, shallow respiration, and cyanosis out of proportion to the physical signs; a temperature steadily feverish, but without marked variations; local evidences of miliary infiltration in other organs.

DISCUSSION.

Dr. A. L. Loomis, of New York: It is a subject that has interested me for a very long time. It has interested me mainly in diagnosis. I have in my mind a case of a man, twenty-six years of age, who came to New York from Chicago, from Dr. Jewett, as a case of nervous disease. I made the diagnosis of pericarditis. The signs were very distinct without fever. There was in this case a temperature at no time over 100°. There was rapid emaciation, and many of those nervous symptoms. These symptoms were followed by paralysis more or less complete on the right side. He died two or three weeks after he came to New York, probably about two months after the first symptoms showed themselves. At the autopsy we found tuberculosis. There were miliary tubercles in the lungs and in every organ that was examined. There is one point in the diagnosis which seems to me to be a very important one, and that is, the rapid emaciation which takes place in all these cases that I have seen. It is not necessary for me to say here to you gentlemen so familiar with this class of cases, that the diagnosis in miliary tuberculosis is very often not made until the post-mortem examination. Not infrequently persons go through Bellevue Hospital and are treated as cases of fever, and at the autopsy are found traces of miliary tuberculosis.

Dr. J. B. Walker, of Philadelphia: I have notes of a case of a mother nursing her first infant. She developed an acute miliary tuberculosis, which ran a very irregular course, developing pericarditis; perfectly normal heart-beat, with a rapid development of pul-

monary symptoms during the early portion of the attack. During the cardiac development the pulmonary activities lessened. With the cessation of the cardiac symptoms there was marked infiltration. The curious point was the development of the pericardial symptoms and their disappearance entirely after the gradual development of the disease toward death. At the time the cardiac symptoms disappeared her temperature recurred to normal. It had gradually been going down, and toward the close it was the ordinary temperature of miliary tuberculosis.

Dr. Williams: Dr. Loomis remarks that the fever was comparatively low. I remember in my hospital experience that the fever resembled that of typhoid, and I think that is our understanding. It seems to me, however, that typhoid fever has been very frequently complicated with this disease, or *vice versa*. But there is not the temperature in tuberculosis which there is in typhoid fever. It certainly seems to me that a temperature of 100° is quite exceptional for miliary tuberculosis.

THE MORTALITY OF ACUTE LOBAR PNEUMONIA,

From a Study of All the Cases of this Disease Treated at the Massachusetts General Hospital from the First Case, in 1822, up to the Present Day.

By C. W. TOWNSEND, M.D.,
AND
A. COOLIDGE, Jr., M.D.,
OF BOSTON.

That acute lobar pneumonia is treated to-day far differently than was the same disease fifty years ago is a well-known fact. Has there been any change in the mortality for the better or worse; and, if so, is this change due to the treatment alone, or is it dependent rather on the changed conditions of life and constitution of the patient, or is it due to any change in the nature of the disease itself?

These and similar questions present themselves, and cannot be answered by a superficial examination of mortality statistics, but demand a thorough examination of the individual cases. To make entirely plain what is meant by this statement, let us illustrate by the following example: Suppose ten patients sick with pneumonia were treated every year at a hospital, and that in the year 1860, of these ten patients, two were over sixty years of age, two were hard drinkers, and two had organic disease of the heart; while in the year 1880 nearly all the pneumonia patients happened to be healthy young adults, an entire change in the treatment having at the same time taken place. It is evident that the death-rate in these two years would be very different, a difference which a superficial observer might claim to be due to the change in therapeutics. But if, instead of merely examining the list of diseases and results,

he had examined the record of each case, it is possible he would have come to a far different conclusion.

At the suggestion of Dr. H. I. Bowditch and of Dr. F. C. Shattuck, and with the permission of the resident physician, Dr. J. W. Pratt, the writers have examined the records of the Massachusetts General Hospital from its first books in 1821 to the present time (May 1, 1889), for the purpose of throwing some light, if possible, on these questions.

But before considering the results, it may be well to review briefly some of the papers which have recently appeared discussing the same subject from data obtained from other hospitals. Dr. Hartshorne, in a paper read before the College of Physicians of Philadelphia, in February, 1888, apparently succeeded in demonstrating that the mortality from pneumonia has greatly increased. In the quarter of a century prior to 1858, he finds from a large number of statistics of cases reported by Skoda, Balfour, Dietl, from the British and United States armies, from European hospitals, and from the Pennsylvania Hospital, that the mortality from acute pneumonia was only 8⅓ per cent. This certainly contrasts in a striking way with the present mortality, which was found by the Collective Investigation Committee,[1] in an analysis of 1066 cases, to be 18 per cent., and which Dr. Hartshorne has found to be stated at about 25 per cent., or more, in the large general hospitals in this country. He thinks that the disease is now practically the same as it was forty or fifty years ago, and that the increase in mortality is due to the change in treatment. To show the great evils of opium, Dr. Hartshorne gives such statistics—among others—as the following: One case in 12.56 died where the treatment consisted of bleeding and the use of tartar emetic; while where opium without bleeding was used, as many as 1 case in 3.3 died. Such statistics, it seems to us, are worse than valueless, for not one word is said as to whether

[1] The Collec. Invest. Record, vol. ii., July, 1884.

the cases were old or young, feeble or strong, debilitated by alcoholic habits or not; neither do they take into consideration a possible variation in the severity of the disease, a fact which is generally recognized in the study of other specific diseases.

Dr. William Osler[1] gives a striking illustration of the worthlessness of statistics taken without such analysis for the purpose of defending a theory, by figures taken from the same hospital (Pennsylvania Hospital), for a different series of years, which, far from showing, as do Dr. Hartshorne's figures, that the mortality has increased, show that it has, if anything, been reduced, as will be seen by these figures:

Dr. Hartshorne's Statistics.		Dr. Osler's Statistics.	
Years.	Mortality.	Years.	Mortality.
1845-'47	6.25 per cent.	1848-'50	37.9 per cent.
1865-'67	18.50 "	1858-'60	21.2 "
1884-'86	31.00 "	1868-'70	22.8 "
		1878-'80	32.7 "

Of 704 cases treated at the Pennsylvania Hospital since 1845, Dr. Osler finds a mortality of 29.1 per cent.

Dr. Osler also gives, without special analysis, the mortality of the Montreal General Hospital and the Charity Hospital of New Orleans, as follows:

Montreal General Hospital.		Charity Hospital, N. Orleans.	
Years.	Mortality.	Years.	Mortality.
1853-'63	16.2 per cent.	1830-'39	44.6 per cent.
1863-'73	16.1 "	1840-'49	35.3 "
1873-'83	23.7 "	1850-'59	32.2 "
1883-'87	20.3 "	1860-'69	43.9 "
		1870-'79	40.2 "

Out of a total of 1012 cases at the Montreal Hospital, since 1853, there was a mortality of 20.4 per cent.; of 3969 cases treated at the New Orleans Hospital, 38.01 per cent. were fatal. The increasing death-rate from north to south, as illustrated by these hospitals, is interesting.

Osler also gives figures from the Edinburgh Infirmary as follows:

[1] University Medical Magazine, November, 1888.

Before 1848, mortality in 567 cases .	.	36.3	per cent.
1848–1856, " " 611 " .	.	21.2	"
1856 upwards, " " 548 " .	.	12.7	"

A further analysis of these cases might show that this decrease in death-rate was deceptive.

Dr. Gouverneur Smith,[1] in a recent article, says that the lowest mortality from pneumonia, at the New York Hospital, occurred in the decade between 1820 and 1830; that the mortality has been rising since then, and has during the last decade reached its acme, considerably over double the earlier percentage. As he truly remarks, however: "Hospital statistics, in order to afford valuable scientific data, must be sifted and classified in groups of cases." He then goes on to say: "Without any such general and accurate figures to guide us relating either to hospital or private practice in this country, but from such sources of inference as are at hand, and from observation, it is now an accepted fact that the death-rate from pneumonia is much greater at present than it has been hitherto." This, to say the least, is a very sweeping assertion.

Recognizing the great danger of fallacious reasoning from hospital statistics, the writers have endeavored, with minds freed as much as possible from preconceived ideas, to analyze each case of acute lobar pneumonia that has been entered in the record books of the Massachusetts General Hospital. In the earlier years the table of diagnoses in the end of each record book was found to be often unreliable, and they were obliged to make their own diagnosis directly from the records. Thus, before 1830, clear cases of acute lobar pneumonia were often found among the diseases entered as "empresma pleuritis," all of which, therefore, had to be examined for this purpose. On the other hand, cases entered as pneumonia, or "empresma pneumonitis," in these earlier days were often clearly cases of broncho-pneumonia or of phthisis. It is evident, therefore, that statistics drawn up from the

[1] Medical Record, October 20, 1888.

list of cases of pneumonia as entered in the table at the end of each record book would show very different results in the earlier years from those we have obtained by a decidedly longer process.

Added to these difficulties was the fact which one can hardly realize now in the day of careful record of physical signs, namely, that before November, 1864, there is no record of the temperature of the patient, and the first temperature chart was made in February, 1867, but these charts did not come into regular use until several years later. Then, too, in the earlier days, examinations with the stethoscope were first coming to be practised, and were entered in the record book as if they were a great curiosity, as these records certainly are now. In cases entered before 1835 there was often no record of physical signs, and we were obliged to infer the seat of the lung lesion from the description of the symptoms. The prolixity of the earlier records, extending over a number of pages, and the unmethodical and, as compared with recent records, unscientific manner of recording facts is very striking. It is often said that as we depend at the present day so much on the observation of instruments of precision, like the thermometer, we neglect to observe the patient; but the writers were both impressed with the abundance in the earlier records of unessential details, and the absence oftentimes of important symptoms and phenomena which should have been noted.

After these introductory and explanatory remarks let us examine the cases.

The Massachusetts General Hospital was opened for patients in 1821, and from January, 1822, when the first case of acute lobar pneumonia was admitted, up to the present time, May 1, 1889,[1] exactly one

[1] The writers were obliged to wait till this late date, May 1, in order to obtain just one thousand cases. It may be remarked here that the writers examined independently alternate volumes of the records, and were interested to find how closely their number and percentages corresponded.

thousand cases of this disease are to be found in the records of the hospital. Of this number, two hundred and fifty were fatal, or exactly twenty-five per cent. of all cases.

The following table shows the total number of medical cases in the hospital for each year, also the number of cases of pneumonia and the number of deaths among the latter.

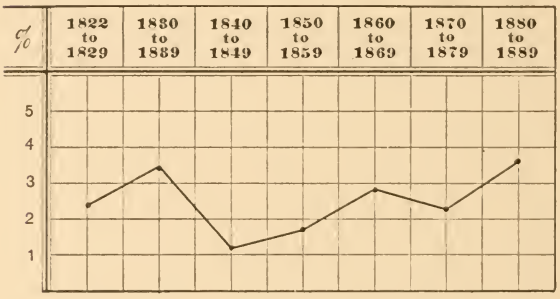
TABLE SHOWING NUMBER OF MEDICAL PATIENTS AND OF CASES OF PNEUMONIA IN THE MASSACHUSETTS GENERAL HOSPITAL FOR EACH YEAR.

Year.	Number of medical patients.	Cases of pneumonia.		Year.	Number of medical patients.	Cases of pneumonia.	
		Total.	Died.			Total.	Died.
1822	67	2	1	1857	418	7	1
1823	111	1	0	1858	456	19	4
1824	225	0	0	1859	530	11	3
1825	229	6	0	1860	494	15	6
1826	321	8	1	1861	543	10	2
1827	339	5	0	1862	606	13	4
1828	291	16	3	1863	703	28	7
1829	354	11	0	1864	669	24	6
1830	287	7	1	1865	390	10	2
1831	326	18	2	1866	377	9	0
1832	318	10	1	1867	459	7	2
1833	328	7	2	1868	456	12	3
1834	335	15	4	1869	544	19	7
1835	311	13	2	1870	518	11	2
1836	326	6	0	1871	563	18	0
1837	255	10	2	1872	652	21	2
1838	208	6	3	1873	691	12	4
1839	211	7	1	1874	740	20	8
1840	205	2	0	1875	852	24	8
1841	217	1	1	1876	829	20	4
1842	189	7	2	1877	687	11	6
1843	186	4	1	1878	713	17	6
1844	242	2	1	1879	658	15	1
1845	225	2	1	1880	814	33	6
1846	238	6	1	1881	830	27	8
1847	309	3	0	1882	796	38	11
1848	414	7	0	1883	701	26	9
1849	448	4	1	1884	803	39	13
1850	335	4	0	1885	918	57	16
1851	412	3	0	1886	930	39	5
1852	382	2	0	1887	1140	55	21
1853	470	6	4	1888	1285	72	21
1854	443	7	0	1889			
1855	402	5	3	to	.....	39	7
1856	440	8	4	May 1			

As until very recently the total number of cases each year was too few from which to draw conclusions of any value, we have divided the figures into periods of ten years, making seven decades in all from 1822 to 1889.

Incidentally, we find a very varying proportion between the number of cases of pneumonia and the total admissions as shown by Chart 1.

CHART I



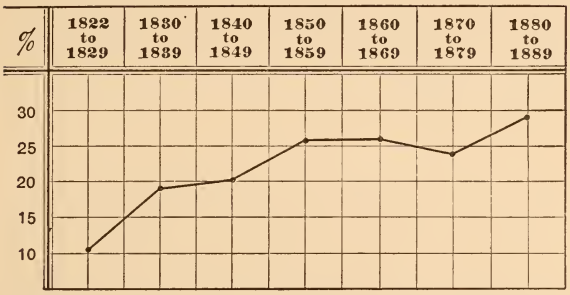
Percentage of cases of pneumonia to total medical cases, in decades.

It will be seen that in the last decade a proportionately larger number of cases of pneumonia have been admitted. It is hardly fair to conclude from this, however, that pneumonia has become more prevalent, as we must remember that with the modern ambulance system many very sick patients are taken to the hospital, while in former years the absence of this system would prevent many who were taken sick with this disease of sudden onset from receiving hospital care. In the 1830 decade, however, nearly as large a percentage of pneumonia cases were admitted to the hospital, while the lowest percentage occurred in the '40's.

A glance at the table giving the cases and mortality in each year shows great variations; in some years no deaths having occurred from pneumonia, in other years a large proportion were fatal. Ar-

ranged in decades and represented graphically we obtain the following chart:

CHART II.



Percentage of deaths from pneumonia to all cases of pneumonia, in decades.

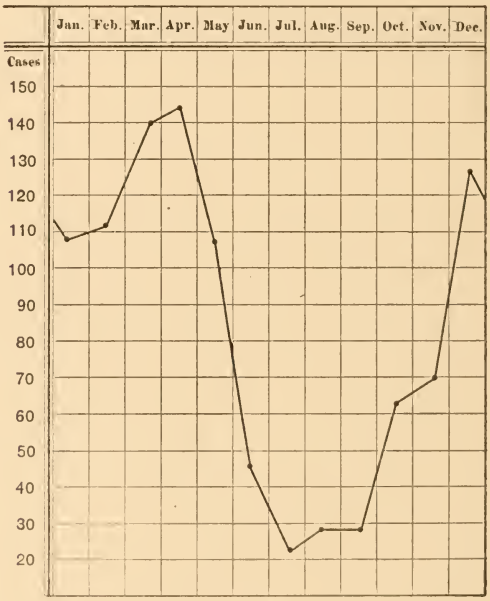
This shows an almost unbroken rise in the mortality from ten per cent. in the 1820 decade to twenty-eight per cent. in the present decade. From this we might infer that pneumonia is much more fatal now than it was fifty years ago, and much more fatal fifty years ago than it was seventy years ago, and that its fatality is steadily increasing—a conclusion well calculated to alarm and depress us.

As we have urged in the introductory part of this paper, conclusions like this should not be drawn until we have examined each individual case, else we may be entirely misled. We all know that the treatment of pneumonia, as of other diseases, has radically changed during the period of years we are considering, but before appealing to this factor as a cause of the change in mortality, let us examine the other factors, which perhaps may partly or entirely be the cause.

We have noted in each case the age, sex, race, previous condition, whether healthy or delicate, whether temperate or intemperate in the use of alcohol, and also the presence or absence of complications. All these are factors of more or less importance in their relation to the mortality. We have

also noted the month of the year and the site of the lesion of the lung, together with the duration of the fever, till death or recovery, and the length of stay in the hospital. The month of the year and the site of the lung lesion, although having but little bearing on the present discussion, are of interest for statistical purposes, and are, therefore, recorded here in the following chart and table:

CHART III.



Total number of cases of pneumonia in each month.

A comparison of this chart with one prepared by one of the writers[1] from an analysis of 412 cases occurring at the Massachusetts General Hospital between 1870 and 1885, shows a great similarity. We calculated the per cent. fatal in each month, but from the irregularity of the results concluded that they were of no significance.

[1] C. W. Townsend: An analysis of 412 cases of lobar pneumonia, etc. Boston Med. and Surg. Journal, March 25, 1886.

TABLE SHOWING PORTIONS OF LUNG INVOLVED IN ORDER OF FREQUENCY.

Seat of lesion	Total.	Died.	Per ct. fatal.
Lower right lobe	337	47	14
Lower left lobe	216	28	13
Both lungs	111	63	57
Upper right lobe	105	25	24
Whole right lung	74	39	53
Whole left lung	39	26	67
Upper left lobe	31	7	23
Middle right lobe	19	4	22

We determined the day of death in all the fatal cases, where this was possible, and found, as shown by the following table, that the eighth day was the one on which most deaths occurred.

TABLE OF DAY OF DEATH.

3d day	7	cases, or	3 per cent.
4th "	7	" "	3 "
5th "	19	" "	7 "
6th "	14	" "	6 "
7th "	19	" "	8 "
8th "	31	" "	13 "
9th "	26	" "	11 "
10th "	22	" "	9 "
11th "	17	" "	7 "
12th "	10	" "	4 "
13th "	7	" "	3 "
14th "	9	" "	4 "
3d week	23	" "	9 "
4th "	7	" "	3 "
5th "	5	" "	2 "

The duration of the fever could not, before the days of the thermometer, be determined with accuracy, but the following table gives this as nearly as possible.

TABLE OF DURATION OF FEVER.

4 days in	15	cases, or	2.3 per cent.
5 "	35	" "	5.3 "
6 "	55	" "	8.4 "
7 "	116	" "	17.7 "
8 "	119	" "	18.2 "
9 "	88	" "	13.4 "
10 "	79	" "	12.0 "
11 "	46	" "	7.0 "
12 "	29	" "	4.4 "

13 days in	19	cases, or	2.9	per cent.
14 "	26	" "	3.9	"
15 "	12	" "	1.9	"
16 "	5	" "	0.7	"
17 "	5	"		
18 "	2	"		
19 "	2	"		
20 "	3	"		
21 "	4	"		
Over 3 weeks in	12	"		

Of 212 occurring between 1870 and 1885, 128 cases ended by crisis and 84 by lysis.

Of the two sexes, there were 724 males and 276 females, of which 182, or 25 + per cent. of the former, while 68, or 25 — per cent. of the latter were fatal. The great preponderance of males, about four times as many, is due to the fact that in early years there were, we believe, larger accommodations for male than female patients, and, as a rule, men with acute diseases are perhaps more likely to be taken to a hospital than women. The British collective statistics from private practice show, however, a similar but not as great disproportion between the two sexes; they record about twice as many males as females. As the mortality in the two sexes was in our cases the same, although usually stated to be higher in females, the factor of sex is excluded in our search for the cause of the increase in the fatality of the disease.

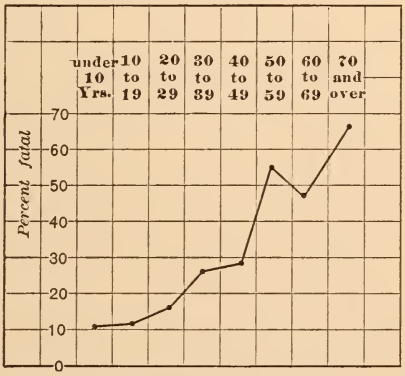
The factor of age is, however, one of great importance, as shown by the following table, and graphically by Chart IV.

Age of patient.	Total cases.	Fatal.	Per ct. fatal.
Under 10 years	10	1	10.0
10 to 19 "	113	12	10.6
20 " 29 "	373	69	18.5
30 " 39 "	217	55	25.3
40 " 49 "	136	40	29.2
50 " 59 "	80	44	55.0
60 " 69 "	32	15	46.9
Over 70 "	12	8	66.7

It will be seen that up to the age of 49 years the mortality gradually increases from 10 per cent. to

29 per cent. After this age it makes a sudden jump of over 20, and rapidly rises above 50 per cent. As only ten cases occurred under 10 years of age, it is hardly fair to lay much value on this mortality rate of 10 per cent., which is probably too high. The only fatal case in this class was a child 2½ years old, emaciated and enfeebled from previous neglect and bad treatment.

CHART IV.

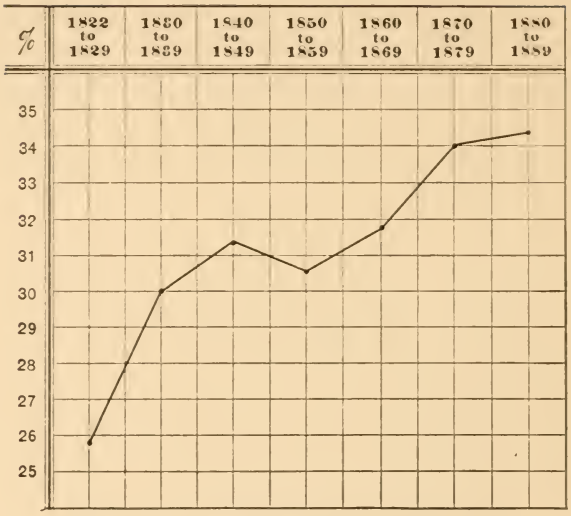


Mortality at different ages.

The break in the rising line of mortality in those between 60 and 69 years of age may be explained by the fact that 60 per cent. of these patients happened to be neither complicated nor intemperate, while of those between 50 and 59 years of age only 55·5 per cent. were free from complication or intemperance. A similar chart in the analysis of 412 cases previously referred to, corresponds almost exactly with Chart IV, but the fall at 60 years does not occur.

Now, an examination of the hospital records shows not only a proportionately greater number of patients over 50 years of age in the latter decades, but the average age, as will be seen by Chart V., has steadily increased from 25½ years in the '20 decade to 34½ years in the '80 decade.

CHART V.



Average age of cases of pneumonia in each decade.

Here, then, is one cause at least for the higher death-rate in later years, and one which is, of course, entirely independent of treatment.

A complete record of the condition of the patient previous to the attack of pneumonia would be of great value, but, unfortunately, was not kept in many of the cases. 445 of the patients were stated to have been healthy; of these, 62 died, or 14 per cent., a percentage considerably under the average. 67 were stated to have been delicate, no especial disease existing; of these, 26 died, or 39 per cent. 161 had acute or chronic complications, and of these, 59 died, or 37 per cent. The complications, with the number of deaths in each, are given in the following table:

TABLE OF DISEASES COMPLICATING PNEUMONIA.

Disease.	Total cases.	Number fatal.
Asthma	6	4
Bleeder	1	0
Bronchitis, chronic	11	5
Cardiac disease	18	5
Delirium tremens	23	15
Diabetes	1	0
Diarrhœa (severe)	6	3
Embolism, cerebral	1	1
Embolism, pulmonary	1	1
Emphysema	2	1
Empyema	6	3
Erysipelas, facial	1	0
Gangrene of lung	3	3
Gastro-duodenal catarrh	1	0
Hiccough (persistent)	1	1
Hemiplegia	1	1
Hemiplegia following pneumonia	1	0
Idiocy	2	2
Intermittent fever	13	3
Lateral curvature	1	1
Measles	2	1
Meningitis	1	1
Nephritis	9	4
Pericarditis	3	2
Peritonitis	2	1
Perityphlitis	1	1
Phthisis	22	7
Pleurisy with effusion	17	4
Pott's disease	1	1
Pregnancy with miscarriage	2	2
Pregnancy without miscarriage	2	0
Rheumatism, acute	8	1
Surgical injury	1	1
Typhoid fever	22	10
Total complications	193	85
Counted twice	32	26
Total patients with complications	161	59

55 were recorded as temperate in the use of alcohol, of whom 8 died, or 15 per cent., while 109 were intemperate, and 45 died, or a mortality of 41 per cent.

The influence which the presence or absence of complications, of good health and of temperance have on the mortality of acute pneumonia is a fact

well recognized, and is duly emphasized by the above analysis. We must next find whether complications and intemperance are more or less prevalent among pneumonia patients at the hospital now than they were in former times.

An objection will undoubtedly be raised here that in former days complications were not so readily recognized as at present, and that particularly in post-mortem examinations the pathologist almost always finds some abnormal conditions which were passed over in silence because not recognized in the older records. Therefore, we should expect to find complications more prevalent in later years. As we felt the danger of this, we think we have avoided it by recording only those cases as complicated where the diagnosis was plain, and where the lesion, if observed post-mortem, was a gross one, and one that was as easily recognized by early as by late reporters. We think all will admit this on examining the list of complications. The complication emphysema, it seemed to us, might be rather too fine a diagnosis for our list, but of the two cases one occurred in the '30 decade and one in the '80 decade, so this certainly ought to remain. Pericarditis, another example, occurred once in the '30, once in the '60, and again in the '80 decade.

Diarrhœa is entered in our list, but only the very severe and generally chronic cases are there mentioned, for a slight or moderate diarrhœa is, as is well known, a not infrequent symptom in pneumonia.

Many of the complications, as will be seen, are chronic, antedating the attack of pneumonia, while the rest, with but few exceptions, although acute, are entirely accidental and independent of the pneumonia. The exceptions, gangrene of the lung, empyema, and in some cases pleural effusion, being a part, as it were, of the pneumonia, should perhaps have been excluded, as it may be said that their occurrence may have been due to the treatment; but these cases are so few in comparison with the others,

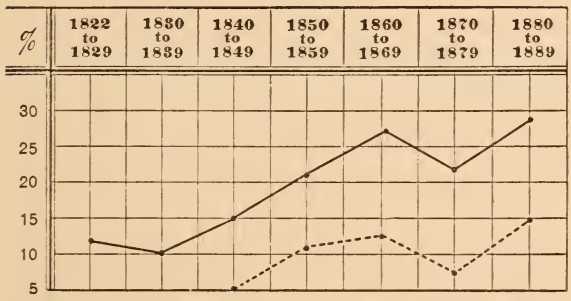
and are so evenly distributed through the decades, that they will not influence the results.

The following table shows the number of cases that were complicated or simply delicate, and the number intemperate in each decade.

	1822 to 1829.	1830 to 1839.	1840 to 1849.	1850 to 1839.	1860 to 1869	1870 to 1879.	1880 to 1889.
Complicated or delicate,	6	11	6	15	39	37	114
Intemperate,	0	2	2	8	18	12	66

Calculating the percentage of these cases to the total number of cases of pneumonia, we find that this percentage, both of the complicated and delicate and of the intemperate, has been increasing, as shown by Chart VI.

CHART VI.



Ratio of the complicated and delicate cases to total number of cases of pneumonia, represented thus.—— Ratio of intemperate cases to total number, thus. . . . .

The only remaining factor is that of race, and our 1000 cases are divided as follows:

	Total cases.	Fatal.	Per ct. fatal.
American (including Canadians)	463	103	22
Irish	371	94	25
Other foreigners . . .	119	36	30
Not recorded	47	17	36
Total	1000	250	Aver. 25

This table shows the least fatality among the Americans, a greater fatality among the Irish, and a still greater one among other nations; but we have

no right to infer that the race factor itself is the cause of this difference. Patients of foreign birth who are taken to the hospital are perhaps of greater age, or more liable to have complications or to be intemperate than those of American birth, and these factors may account for the difference in mortality. It occurred to us, therefore, that it would be interesting to see what the percentage of mortality would be in the different races, omitting all those fatal ones who were over fifty years of age who were intemperate, delicate, or complicated, factors which we have shown are sufficient cause for a large mortality. The results obtained are as follows: Americans, 9 per cent. fatal; Irish, 11 per cent. fatal; other foreigners, 14 per cent. fatal. Comparing these percentages with the former ones, we find that the proportionate mortality of the different races remains almost as before, with the exception that Americans are even more favored than by the first analysis, while among foreigners, with the exception of the Irish, the mortality is proportionately greater than before. The reason of this may be that our most poorly nourished classes are largely foreigners.

CHART VII.

Percentage of Americans, Irish, and other foreigners, by decades.

During the early part of the century American patients were, of course, more abundant, relatively, than they are now; a fact which is shown by Chart VII., which gives the percentages of the three classes among the pneumonia patients in the hospital by decades.

From the descriptions of the disease contained in the records there seems to be no reason for thinking that the character of pneumonia has susceptibly changed in this series of years.

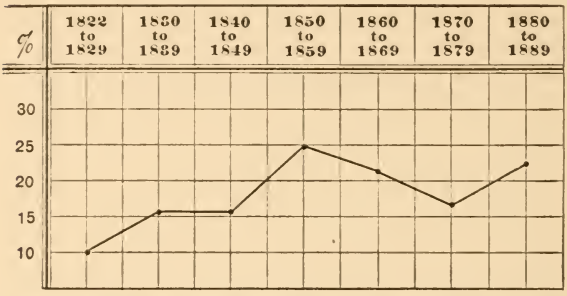
To sum up the results of the analysis, so far, we may say that the sex of the patient has in these cases no influence on the mortality; that the age of the patient is of great significance—the older the patient the greater the mortality; and that over the age of fifty years more than fifty per cent. die; that intemperate patients are far more apt to die than temperate patients; and that the mortality in the patients who are delicate or who have some complication is much higher than in the healthy and non-complicated; and, finally, that the proportion of deaths among Americans is less than among Irish, and in these latter less than among other foreign nations, and that this difference is not dependent as far as our studies show, on the existence of more frequent complications or intemperance among foreigners.

We have also seen that the average age of the pneumonia patients has been steadily increasing from the earliest decades of the hospital to the present day; that the relative number of intemperate and of delicate patients has increased, and also of cases complicated by other diseases, and, finally, we have seen that the proportion of foreign-born patients has also increased.

Let us see how much influence each of these factors has had in increasing the mortality from pneumonia in the hospital, and whether it is possible that all of them together may not be the whole cause, and that it will not be necessary, as might have been our first impulse, to appeal to the change of treatment as the cause of this increase in the mortality.

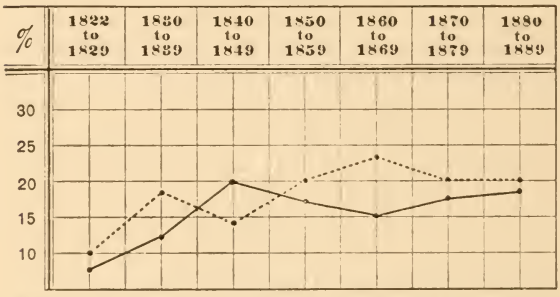
In order to learn the answer to these questions we have prepared the following charts which we think explain themselves:

CHART VIII.



Percentage of mortality from pneumonia, omitting those who died over fifty years of age, by decades.

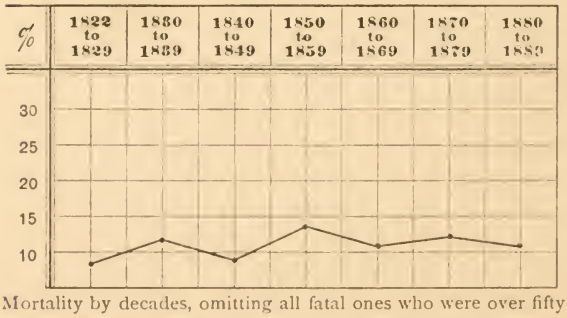
CHART IX.



Mortality omitting the delicate and complicated who died, represented thus ———

Mortality omitting the intemperate who died thus .....

CHART X.



Mortality by decades, omitting all fatal ones who were over fifty years of age, or were delicate, complicated, or intemperate.

This last chart represents, then, the mortality in the hospital by decades, excluding all cases whose death can reasonably be accounted for, that is to say, all who died who were over fifty years of age, were intemperate, delicate, or who had complications. As will be seen, instead of showing as in Chart II., a regular and decided increase in the mortality from the earlier part of the century to the present day, it shows but little variation from decade to decade, and we certainly could not infer from this chart that the mortality from pneumonia had on the whole changed in the last sixty-eight years.[1]

We must conclude, therefore, that, as shown by this analysis, the mortality of acute lobar pneumonia at the Massachusetts General Hospital has remained practically the same from 1822 to 1889, notwithstanding the great changes in treatment, and that the disease is the same now as it was sixty-eight years ago. This result, although not very encouraging, is certainly far better than was the hasty conclusion drawn from the mortality table alone before analyzing the cases.

But are we to infer that treatment is of no avail? Has it not had any influence on the duration of the disease or of the convalescence, and how has the general condition of the patient in these two stages been influenced by the treatment? A short *résumé* of the treatment at different periods is necessary before we can answer these questions.

Prior to the year 1850 the treatment was truly heroic; almost every case was vomited and purged, given mercury to salivation and sore gums, blistered with cantharides, and bled. Of the 187 cases before 1850, 115 or nearly two-thirds were bled. The quantity of blood taken was often large. In 1833 one case was bled three times to the total amount

[1] It is probable if we had taken into consideration the increase in foreigners and the decrease in Americans of late years, that Chart X. would have been more nearly a horizontal line than it is now.

of fifty ounces, and forty-eight leeches in all were applied during his illness. Another case was bled during his illness sixty ounces, or nearly two quarts. Local wet-cupping and leeching at the same time with venesection were also used.

The diet in this period was a low one, as can be seen by the following examples taken from the records: "May have juice of quarter of an orange at a time." "May have a teacup of milk three times daily with cracker." "May have broth not exceeding four ounces and repeat in four hours if he wants it." This low diet was also continued into the convalescence. Thus, in 1849, a patient on the fifth day of the convalescence was allowed "Broth six ounces at noon."

In the '40's mercury and emetics were less frequently used, but the patient was still given tartrate of antimony and kept on the verge of vomiting. Blisters at this time were also gradually omitted and replaced by sinapisms.

Cantharides, besides producing much local effect, was a frequent cause of strangury, so that catheterization had to be resorted to. The sores made by the blister were irritated by various drugs in order to obtain a more intense effect, so that gangrenous sloughs and ulcers slow in healing were not infrequent results. During the convalescence such records as these were not uncommon: "Complains of nothing but ulcer left from blistering." "The black slough from the blister beginning to separate."

Cathartics were given freely, not only in the hospital but before their arrival there. One case, a man of twenty-three years, was said to have had fifty dejections on the third day of the disease after taking cathartics at his home, and it seems as if the fatal result might be attributed to this.

Before 1850, opium was scarcely ever used, and in no case was the treatment an expectant one. The occasional use of colchicum and other drugs was noticed. Stimulants during the period before 1850 were almost never given, and then only in minute

quantities, generally just before death. For example, one of the earliest mentions of its use is in 1839, when the following record occurs: "May have a tablespoonful of cider." In another case: "Wine whey if skin becomes cold;" this was given a few hours before the patient's death. As another example, may be mentioned a patient forty-four years of age with a complicating pericarditis and the history of a cough for ten years, who was kept on a low diet, was bled, vomited, purged, and blistered, and was not given any alcohol. The patient died.

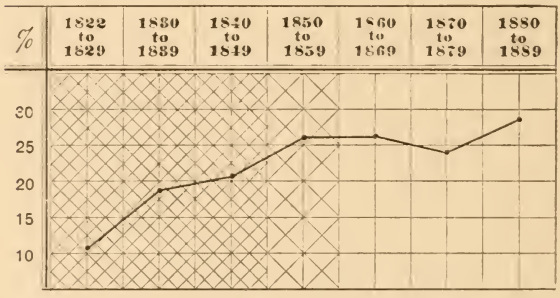
From 1850 to 1860 seems to have been a transitional period in the hospital treatment of this disease, and for the first time we meet with cases which were treated practically in an expectant manner, 11 out of 72 cases being so treated in this decade. Opium in occasional moderate doses, generally in the form of Dover's powder, was then used for nearly the first time; syrup of Tolu and "fever mixtures" containing nitre were also given, and an occasional administration of quinine and veratrum viride was also noticed. Less than one-third (19 cases) were bled, and the other heroic measures were proportionately decreased. Alcohol was used more frequently just before death, but the fear of giving it while there was fever is evident from such a record as this in 1858: "May have cider ℥vj or ℥viij in the twenty-four hours if no more fever."

Soon after 1860, the records show that pneumonia patients were being systematically fed with milk and broths. Heroic treatment became a thing of the past, emetics, cathartics, mercury, and blisters being discarded, and there are records of but six cases of venesection after the year 1860, and leeches were used in only a very few. Alcohol was given systematically from this time. Of 741 cases treated since 1860 there is record of the use of alcohol in 353 cases. A comparison of the mortality of those to whom stimulants were given and those treated without them would be useless, for the more severe and

feeble cases were given alcohol, and nearly all received it before death.

The treatment by drugs was slight after 1860. In the 60's and early in the 70's wine of ipecacuanha in small doses was largely used. After 1875 carbonate of ammonium was the drug most frequently prescribed. Opium was given in many of the cases, generally in moderation, to relieve pain. Digitalis was also used to some extent. There are but very few records of quinine in the large doses sometimes used in New York and elsewhere. In the last few years antipyrin and acetanilid have been used in a few cases, but we may say that, as a rule, since 1860 the treatment of pneumonia at the hospital has been largely sustaining and expectant.

CHART XI.



Same as Chart II., also showing periods of treatment. Before 1850 heroic; between 1850 and 1860 transitional; after 1860 expectant.

A glance at Chart XI., which is the same as Chart II., but shaded to indicate the periods of different treatment, shows that the entire rise in the mortality took place during the period prior to 1860, when the treatment was entirely or partly heroic.

This fact alone, even if we had not demonstrated the same truth by another method, shows the entire lack of connection between the mortality rate and the method of treatment.

Is it possible that the heroic treatment contained both bad and good elements, which by counteract-

ing each other, gave, as we have seen, exactly the same results as by the expectant method; and, therefore, if the bad elements were eliminated we should have better results than by the expectant method? In the light of our present knowledge of the bacterial nature of the disease, is it possible that the germicidal mercurial treatment constituted the good element?

After this digression let us now answer the questions as to the duration of the disease and of its convalescence as affected by treatment. We obtained the average duration of the fever and found it to vary in each decade but a small fraction from nine days. The duration of the convalescence also, as shown by the length of stay in the hospital, has not changed, for in each decade the average stay of each patient varied but very little from three weeks and four days.[1]

One more point is of interest. Did the aged and delicate, the complicated and the intemperate have as good a chance for recovery under the old heroic treatment as with the later sustaining one?

Counting all the cases of these classes together, which means that many are counted twice, we find before the year 1860, or during the heroic period, 62 cases among these classes, with 25 deaths, and after 1860 397 cases, with 165 deaths. Reduced to percentage, we find the mortality to be almost exactly the same, namely, 40 per cent. in the first period and 41 per cent. in the second period.

We must, however, admit that the present treatment of expectancy, a treatment which makes the patient as comfortable as possible, preserves his strength and avoids everything harsh, is certainly

[1] The table shows the average duration of fever and stay in the hospital in each decade.

	1822 to 1829.	1830 to 1839.	1840 to 1849.	1850 to 1859.	1860 to 1869.	1870 to 1879.	1880 to 1889.
Fever (days)	10.5	8.7	9.1	9.1	8.9	9.5	9.2
Stay in hospital (weeks)	3.6	3.5	3.8	3.7	4.2	3.4	3.6

far more agreeable to the patient than the former heroic method.

After these studies we cannot but admire the regular and uniform manner in which pneumonia—that type of self-limited diseases—has run its course in all these years uninfluenced by the varying treatment it has received.

Summary.

1. In the 1000 cases of acute lobar pneumonia treated at the Massachusetts General Hospital from 1822 to 1889, there was a mortality of 25 per cent.

2. The mortality has gradually increased from 10 per cent. in the first decade to 28 per cent. in the present decade.

3. This increase is deceptive for the following reasons, all of which were shown to be a cause of a large mortality:

(*a*) The average age of the patients has been increasing from the first to the last decade.

(*b*) The relative number of complicated and delicate cases has increased.

(*c*) The relative number of intemperate cases has increased.

(*d*) The relative number of foreigners has increased.

4. These causes are sufficient to explain the entire rise in the mortality.

5. Treatment, which was heroic before 1850, transitional between 1850 and 1860, and expectant and sustaining since 1860, has not, therefore, influenced the mortality rate.

6. Treatment has not influenced the duration of the disease or of its convalescence.

DISCUSSION.

Dr. A. L. Loomis, of New York: I can second what the President has already stated, that no other work done by the Association comes anywhere near this work. It seems to me to be the fullest and most comprehensive statement in regard to the ratio of mortality of pneumonia for the last seventy years that has yet been given to the profession. We all know how figures can be made to tell us almost anything, but the gentlemen who have prepared this paper seem to me to have excluded almost every possibility of error so far as statistics can furnish facts. And I am delighted with the results, Mr. President, for I have long maintained in my studies and my teaching of pneumonia that the disease had not changed its effect, severity, or its ratio of mortality; that pneumonia was now what it always had been, and that at the present time we are better able, perhaps, to study it than ever before, because we separate it from all other pulmonary diseases. We have recognized the fact to commence with, that acute lobar pneumonia is an infectious disease, and that it is a self-limiting disease, and it is to be modified very little by treatment. It runs its course and the results will be determined, not by the treatment, but by the condition of the patient, age, etc., at the time. There are cases of pneumonia that will die whatever the treatment may be, and there are cases of pneumonia that will recover under any plan of treatment. It seems to me that we have to recognize this fact in our dealings with this disease; and the accurate, carefully prepared tables which we have before us, seem to me to bear out this position and this view. I am not of those who believe that while pneumonia is an infectious disease that it has a specific microbe, but that the microbe which produces diphtheria may produce a pneumonia and that the pneumonias which occur in sewer-poisonings and from many infectious things which we have are not due to any specific microbe, but to a microbe which may be developed by itself.

I do not believe we shall ever reach a special microbe that will produce pneumonia, or the only microbe which will produce pneumonia. I say we may have pneumonia produced by very many microbes which must be present in all cases. That seems to me to be the position which

we can occupy to-day. And those who are studying under the best facilities have reached that result.

Dr. H. I. Bowditch, of Boston: I have only one remark to make: it seems to me a most valuable paper. I want to suggest that it ought to stimulate us in every way to try to find some means of preventing—if we cannot cure it. If the violent treatment which we gave them fifty years ago when we bled them and leeched them and put on plasters, etc., it that does not do harm, and prevents pneumonia from going on and kills it, then it is high time for us to look for something that will prevent. The extermination of the disease is the great point nowadays. I was very much interested in the paper.

Dr. F. C. Shattuck, of Boston: I would like to say I am extremely proud to have my name appear in this paper. I had hardly anything whatever to do with the production of it. The subject has been one which interested me very much ever since that article of Dr. Hartshorne, to which the reader alluded. And Dr. William Osler wrote to me and asked me for statistics from the Massachusetts General Hospital. I was obliged to tell him that the statistics could not be had except by the expenditure of enormous labor. And that labor has been expended, and we now have these statistics. I should like to ask Drs. Townsend and Coolidge how large the number of cases was in the early years—how high the numbers run.

Dr. Townsend: They were very few in the early years, so that we were obliged, in order to get any results worth counting, to give them in decades.

Dr. Shattuck: Can you tell me how many there were in the first decade?

Dr. Townsend: There were fifty cases during the first decade. That was the smallest of all.

Dr. Shattuck: That is a point on which a little stress must be laid. When you come to deal with a small number of cases, and fifty in a decade is comparatively small, a number of cases favorable in character for a few successive years, or a run of unfavorable cases would make a decided difference. You put on two or three, or take out two or three, and there is a good deal of difference in the result. The larger the number of statistics the smaller the chance of error from such a result. If the mortality has remained stationary at twenty-five per cent., that report shows an improvement of therapeutics in this

way: The population of Boston was an extremely homogeneous population, the town was surrounded by water, there were large open places about the houses and the sanitary conditions were good, except that the patients had wells, and in those days the well and the out-house were near together. To-day, the population is a mixture of many nationalities. We have something like 5000 Portuguese here in Boston. We have large numbers of all sorts of people, and innumerable Irish. The tenement-house system is in vogue here, owing to the very high price of land. And while the sanitary condition of the upper classes has improved very much, that of the poorer or middle classes has not improved to anything like that extent. In many cases it has probably deteriorated, and it is from the middle, and especially poorer classes, that the material is drawn which furnished the figures for these statistics; therefore it seems to me that if the mortality rate remains the same to-day that it was fifty or sixty years ago, the treatment must be better or we should lose many more patients.

THE THERAPY OF OCEAN CLIMATE.

By ALBERT L. GIHON, A.M., M.D.,
MEDICAL DIRECTOR, U. S. NAVY.

The self-styled lord of creation has begun to recognize that he is really creation's slave. The complacent Gullivers of science have so intently regarded the Lilliputian subjects with which they have peopled their domains, that they have had no eyes for the Brobdingnags of Nature's wide realms, beside which they are like the tiny insects they themselves crush at every step. The tendency of closet research is to make the scientific student, in proportion to his zeal, so absorbed in his immediate surroundings that he sits poring over his lettered page, never raising his head to gaze outside his window upon the starlit night or glaring day, his dulled ears giving no heed to Nature's noisy harmonics, and every other sense under the thrall of his intense abstraction. He reads about that world which he has but to lift up his eyes to behold for himself, like a young shipmate of mine many years ago, whom I missed when we were sailing up the beautiful river Min, and found below in his state-room, absorbed in some other traveller's description of the ascent of the Nile. Man builds his little man, fashions a god for him in his own image, feeds and rears him by his own mathematical rule of three, and ends by believing that he has created a masterpiece, which he can mend, as he has made, by formula and dose. The science of Medicine, while above all other sciences, with Γνῶθι σεαυτόν for its watchword, has done much by hasty conclusions and ill-considered inferences to mislead its followers into dim by-paths of theory and speculation, from which the sanitarians, climatolo-

gists, and demographers are only now dragging them back upon the bright high-road of common-sense. It is not merely the young physician who credulously believes that pharmacotherapeia is the end and aim of all medical knowledge.

Look but at the squalid pauper child, blear-eyed and scrawny-limbed, hieing from the public dispensary with ointment and bottle—zinc, iron, and arsenic—to its miserable home, to sleep in filth and feed on kitchen refuse or spoiled street garbage.

Look at the half-starved seamstress, treasuring charity's coveted gift, the prettily labelled valerianate which is to still the cry of hungry nerves, or the bitter tonic which is to give her an appetite that she has sought to appease with tea and crusts.

So, too, luxury's pampered offspring and the weakly inheritor of constitutional vice gets his or her potent theriac in cut-glass bottle or gaudy box, which is in a trice to undo the sinful work of fathers to the third or fourth generation, or mend the marring which they have themselves been a lifetime doing.

Half a century of years has not dimmed the vision of a child gasping for breath—of long imprisonments in a sick-room, hallowed, however, by the tender offices of three gentle saints of women—of a kindly old gentleman, the venerated family doctor, whose well-appointed equipage clattered to the door almost as regularly as the butcher's wagon—of a succession of bottles with nauseous and foul-smelling contents—stramonium and asafœtida, and guaiacum, and a host of other narcotics and antispasmodics, of which, thank God, I now know little else than their names, with which this learned physician sought to exorcise the demon asthma, and through which this child—which was myself—grew to manhood with sensitive, drug-shattered nerves that even the pure breath of heaven jangled; with feeble, fluttering pulse that forbade the plays of boyhood as too great an effort for the weakened heart; with stomach so coddled by dainty diet that a piece of honest fat or rare roast

beef summoned the reflex harbingers of the dreaded wheeze and a new battle for breath. Muffled to the eyes lest air should be blown upon my hyperæsthetic surface or dampness chill, I was as strange to out-door life as the inmate of the harem who flits across the narrow street, until, impelled by that mysterious attraction for an unknown opposite, I chose the Navy as my vocation, and when the land on which I had suffered sank below the horizon, became enamored of the spectacle of boundless waters which till then I had never seen. I lived in the open air, save when the need of food and sleep kept me below. My lungs could not drink in enough of the ocean breeze; my flaccid muscles hardened under the sunshine and impelled me to pace the white decks hour after hour, watch after watch, without fatigue or surfeit. Unpremeditatedly I had exchanged for the therapy of the materia medica the therapy of ocean climate, and to-day, after the lapse of a generation, of which a third has been passed upon this blue deep, I can, in my own person, bear testimony to its healing efficacy, which is the purport of this brief essay.

Every natural kingdom—mineral, vegetable, and animal—has been levied upon to fill the therapeutic storehouse of the land. The *Dispensatory* has passed its thousandth page, and now comes the chemist with his laboratory compounds of barbaric, agglutinated nomenclature to lengthen the list interminably. Happily if, when all these sleuth-hounds are unleashed to course haphazard through the capillary mazes of brain and parenchyma, each laggard cell be chased to duty or each mischief-making microbe be brought to death. Pitiably small beside the gorgeous, palatial shop of the city apothecary is the sea-farer's medicine-chest. Pitiably poor, on the other hand, are all the drug-mills in every country on the earth piled up in one, beside the ocean's great reservoir of therapeutic resources, which are stored under no lock and described in no mystic language, yet brief as the decalogue; bartered for neither gold nor silver, yet priceless in their intrinsic value.

It has come to pass that the advertising outside pages of medical journals outvie their prosaic contents in number and in novelties. I have one before me in which the former sum up sixty-eight, to fifty-two pages of legitimate reading matter. The ills that men suffer, which are told in the contributors' and editorial columns, are much the same as those which plagued Job and made David "go mourning all the day long;" but he must be a busy reader who can keep pace with the manufacturing druggist's creations, and learn to roll *diæthylsulphondimethylmethan* glibly over his tongue as he did salts and senna, when these were ruling powers. How much higher shall this clay-footed idol of Pharmakia rear its gilded head! With plaintive voice hygiene bids men listen to reason, but the Juggernaut of drugs still lumbers on, crushing out the lives of willing victims.

The iconoclast is sure of an ungracious reception. A heretic in the eyes of his fellow-priests, a scoffer to the world at large, those whom he would benefit seek to crucify him, and spurning his simple talk, listen with eyes, mouths, and ears all agape to jargon which is the more pleasing as it is less understood. "Oh, ye of little faith" cannot be a reproach to us of the great school of Medicine. We patter our creeds as our fathers did, and lest we be thought agnostic, follow the ritual under Jupiter's propitiatory sign, which by gramme or grain furnishes an antidote for every ache and ill.

Nevertheless, one after another among our elders rises to cry halt, in the mad haste to add to the already long list of medicaments. Who is the pharmacologist who will himself be first to wipe out the ninety and nine, that the one faithful friend of man in every hundred may receive due credit?

Under the lead of the physicist as physician the warring hosts of disease have been one-half thinned by the common-sense teachings of preventive medicine, and what the sanitarian fails to avert the climatologist now essays to cure by means as truly

therapeutic as any the apothecary can supply. Nevertheless, even he has found no catholicon, and there will be left for skilful surgeons, expert specialists, and adroit prescribers a field rich enough in gnarled growths whereon their learning and dexterity will be the more conspicuously exercised as those are weeded out which have made sham reputations for shallow sciolists.

Every special organization, such as ours, is subject to suspicion as being narrow in aim, distorting in statistics, and panurgic in pretensions. Over-zealous specialists possibly are prone to see beams in every eye or to find the *fons et origo* of every malady in the particular region they have appropriated, and each a panacea in his own little shagreen box.

The climatologist bids you "throw away your drugs and follow me," but, alas, even climatologists do not all follow the same broad, beaten, well-swept road, but one seeks to lead the way to the rarefied atmosphere of the elevated plateau—another plunges into the depths of the pine forest—a third coaxes you to the balmy air of the sheltered sea-shore; and you—perhaps it may be said—you would embark us all on board ship to find the golden fleece of health in mid-ocean. Were this so, it would be to recommend a dose I have no wish to take and to champion a place I look back upon with anything but longing, so I may well escape the charge made against too many climatologists of seeking to advertise a locality in which they have the manifest interest of residence.

The ocean knows no ownership. The marine league, over which the potentates of earth fight for jurisdiction, is but a narrow edging to the thousands of leagues which only the mythologic Neptune sways. The land has been parcelled among the nations until to-day the newborn sons of Adam open their eyes without a birthright to the soil on which they look, and in which their dead bodies are begrudged an unbought resting-place. Even the air and light are only free till some landlord's

fencing stops them. But all the majesties and powers that live, together rule but a small part of this little globe compared with the seven times greater expanse of waters, over whose face we can roam unchecked, paying no toll to sovereign or suzerain. Nor is it all a dreary waste of water, for if we could look down upon it from above, we would find its surface well-dotted with the moving habitations of a race which knows scarcely any other home—a race all males, which speaks a language shore-folk cannot understand, and has its own habits, customs and occupations. The climates of the various regions of the solid earth materially affect the physical condition of the beings which inhabit them. How is it with this great restless mass of fluid? Has it a characteristic climate, which makes or mars the one who lives upon it? Is there death on its face as in its depths, or is there healing in the air which sweeps across it uncontaminated by the foulness of the earth and its inhabitants?

A few words only as to ocean climate, and as brief a suggestion of its therapeutic value for the dwellers upon the land.

The elements of ocean climate are necessarily few: A superincumbent atmosphere free from impurities in proportion to the distance from land, with a temperature of very limited range through the absence of local disturbing agencies, and having diffused through it a correspondingly uniform amount of aqueous vapor. Nowhere over the ocean does the mean daily fluctuation of the temperature of the surface quite amount to a degree. The temperature of the atmosphere has a rather wider range than that of the sea on which it rests, but this is very much less than anywhere on the land.

Only the weeds of the Sargasso Sea enjoy perennial abode among these simple climatic conditions. The longest passages of sailing vessels seldom extend beyond two or three months. Were they years long, the monotony would pall upon the voyager and make him sigh for the green fields and sandy

plains of terra firma with all their unwholesome smells.

Next to the transitory exposure to ocean climate in the course of a sea-voyage is the residence on some small mid-ocean island where there are few vicissitudes of weather, short range of temperature, and none of the physical befoulments from masses of men and animals or decaying vegetable matter. Here, even better than on shipboard, is to be found the opportunity for making ocean climatic influences available as curative measures.

The therapeutic uses of climates, as of drugs, are to be inferred from their physiological or pathogenetic effects. What is the influence of life upon the ocean on the well man-of-the-sea? He is of two orders: One the merchant sailor, who begins his career after the land-shark has left him penniless, debauched, and diseased; who is kennelled like a brute in a gloomy, filthy, unventilated forecastle, is ill-fed, scantily clad, maltreated, and overworked. What of value can be learned from his physical history beyond the general fact, that such as survive come into port after a long voyage, notwithstanding the sparse fare, exposure, dirt, neglect, and ill-usage, still strong and vigorous? Though much of this is due to a certain enforced regularity of life and the interrupted sacrifice of health at the shrines of Bacchus and Venus Porcina, much is also due to the invigorating influence of protracted exposure to sunlight and pure air in their out-door work.

Of the better class of the men-of-the-sea—the man-of-war's-man—we might expect to learn something more definite. He too is recruited from the slums of the shipping quarters, but he is required to be clean, sober, and absolutely free from disease when enlisted, and after that is well fed, clothed, and treated, so that his medical history may be assumed to give some indication of the causes of disease to which he has been subjected; but the medical returns of the various naval services are chiefly summaries of the cases of disease and injury treated, arranged,

so far as the British and American Navies are concerned, under the customary nosological classification of the London College, and, consequently, indicating but little as to the precise first causes of these diseases, whether contracted during visits on shore or developed *ab origine* in well men during their sojourn upon the high seas from causes there in operation. The rheumatism of the syphilitic, for which Neptune cannot be blamed, and the rheumatism of bad weather, which is a very decided salt-water affection, usually go into one class to swell a common total. The pulmonary phthisis for which an ancestor is responsible and the phthisis which the foul, damp air of the unventilated berth-deck has developed are undistinguished, though only the latter is of statistical interest as a product of ocean pathogenesis. The fact, too, that naval medical returns include those of the naval establishments on shore as well as those afloat, prevents the identification of the strictly nautical affections, but, notwithstanding this, it is interesting to note in the last published report of the Surgeon-General of the Navy of the United States, that among a total of 8550 admissions of sick and disabled officers and men of the Navy and Marine Corps, nearly ninety per centum were included in the following few classes, to wit:

Casualties	1917
Venereal diseases	1071
Diseases of the integument	888
Malarial and other fevers	888
Affections of the nervous system	489
Diarrhœal affections	483
Rheumatism	521
Inflammatory affections of the respiratory tract	1149

the remaining 1144 being distributed over a wide range of titles, of which many, as adynamia, cephalalgia, constipatio, odontalgia, etc., have no special significance. It is probable that only about one-fourth of the cases of disease occurring at sea are attributable to any of the circumstances of oceanic

life, and these are almost entirely inflammatory affections of the air passages and intestinal tract, neuroses including nausea marina, and rheumatism.

It is evident there is no saving balm in salt water which hardens the sailor against aching muscles and swollen joints, and such of his ailments as are not the results of exposure to vicissitudes of weather are caused by decks needlessly wetted for cleaning, and the overcrowding of his badly ventilated quarters—but this is man's work, not nature's. While these are characteristic affections of the men that follow the sea, these complaints are not in any sense climatic, but are due to the occupation of the seaman and to local unsanitary conditions, and the greater proportion of them are avoidable. Consequently, they have no bearing upon ocean climatic therapeutics, which does not comprehend exposure to bad weather, wet and overcrowded decks, or exhaustive labor upon sails and anchors.

What then, since there are so few causes of disease in operation, may the seeker after health hope to gain by a sea-voyage or by prolonged residence on some ocean island where all the conditions of sea-life prevail?

First, if season, course, and destination be judiciously chosen, the invalid will obtain, on a long voyage, in a comfortable sailing vessel, *rest*—of mind and body—a condition of absolute insouciance, and relief from the cares and distractions, the daily worries and anxieties of life, the interruptions and noise and turmoil and excitements which railroads, telegraphs, and newspapers bring into the very sick-room on land.

If not so completely bed-ridden (in which case he probably ought not to go to sea at all) but that he can lie in an easy chair on deck, he will be able to breathe and bathe in an air that is barren of every impurity, and with every inspiration experience a sense of pleasurable invigoration.

If sea-sickness is not an indomitable idiosyncrasy, as I have known it to be even in captains of the

navy, he will, after a few days, when he "gets his sea-legs," as sailors term it, find inexpressible delight in pacing the narrow bounds of the quarter-deck, and lengthen the hours of this gentle exercise until they become whole watches long.

Once accustomed to the motion of the vessel and of the sea, nausea will give place to appetite, which is sharpened as well for old salts as land-lubbers, and the plainest food will be taken with unwonted relish, betokening improved assimilation. If care be had to overcome the usual tendency to constipation, ingestion may go on without restraint. The eagerly anticipated meal-hours become the eventful marks of the passage of time. The whilom patient eats and sleeps, and wakes to find new zest in the simple employments of the day. Rocked in the cradle of the deep, the ocean's lullaby soothes the sufferer into forgetfulness of his ills.

A long sea-voyage in temperate latitudes on board a clean, roomy vessel, well outfitted and equipped, is a judicious therapeusis for chronic invalids of almost every class; but to be effective the ship itself must be free from the dirt, dampness, and bad ventilation which, under aggravated circumstances, made scurvy, ship-fever, and dysentery actual scourges of sea-life, and in a less conspicuous degree show their effects in the rheumatism, phthisis, and diarrhœa which are needlessly frequent among sailors. Only a clean ship can be a healthy ship, and it is just as axiomatic that a foul ship will develop, breed, and transport disease. The filthy mess in the bilges of old-time men-of-war, where the heresy of naval hygiene was not permitted utterance—the putrid mixture of salt- and fresh-water, coal-dust, oil, provisions, and decomposed timber—an artificial marsh as pestiferous as any miasm-breeding quagmire on land, gave forth emanations which blackened the paint and pervaded the atmosphere, enveloping the ship with a polluted aureole that clung to her through all her course. In those days the scent of bilge-water was considered as inseparable from a vessel as

the barnacles on her bottom. If naval medical officers have lacked opportunities for distinction as operators or diagnosticians, they have still fought a good fight and gained a glorious victory in the cause of true medicine in the revolution they have effected in methods of life at sea. Virulent diseases have become extinct, and the heights of sanitary independence have been gained, whence it is possible to point out the weak places through which the enemies of human health gain entrance, and at which their further passage must be prevented.

Under any circumstances, however, a ship is useful only as a temporary expedient. In the often-quoted instance of Collingwood's flag-ship, "which with a crew of eight hundred men was, on one occasion, more than a year and a half without going into port, and never had more than six on her sick-list; this result was occasioned by his system of arrangement and his attention to dryness, ventilation, etc., but above all by the contented spirit of the sailors, who loved their commander as their protector and friend, well assured that at his hands they would receive justice and kindness, and that of their comforts he was more jealous than of his own;" but the circumstances were exceptional, and in the case of confirmed invalids a too prolonged residence on board ship becomes depressing. Hence, stationary hospital-ships are not desirable where local insalubrious influences do not prevent establishing the sick on shore. Gliding over the water day after day with the consciousness of progress and the prospect of an end, however distant, is quite another matter from riding at anchor in a harbor, watching, from a sick cot, green fields and purple hills. There is something, too, in the tonic touch of earth upon one who has been very long ill at sea—some mysterious influence affecting the molecular relations of the human body, which cannot for too great a time be intermitted, so that the therapeutic advantages of cruises are only limited.

The slowly convalescent from whatever disease—

from protracted fever, chronic diarrhœa, nervous asthenia—the incipient pulmonary case, the feeble, fretful valetudinarian, the overworked business man, the broken-down woman, the child with slender hold on life, if sea-sickness is controllable, will, after a few days of pleasant sailing, recover appetite, and often recuperate with marvellous rapidity. The inebriate removed from the temptation or the means of self-gratification; the not inconsiderable class of cases of sexual exhaustion and of other forms of impaired nervous power; the thousands of victims of their own follies who fill the sanataria, private hospitals, and health-resorts; the irritable *malade imaginaire*, and melancholy hypochondriac and misanthrope are especially benefited by the quiet restfulness of a long sea-voyage in pleasant weather, when the assimilative process becomes the dominant function, and the worn brain and flaccid vessels and feeble lungs are beguiled into feeding on what will make them strong again.

Indeed, so serviceable a measure for restoring health ought, ere this, to have led to special provision for accommodating invalids—floating sanataria—sailing vessels by preference by reason of the less rapid transition to higher or lower latitudes, with auxiliary steam power to carry them across calm belts, drive a ventilating fan, operate a dynamo for electric light, and furnish steam for artificial heat and other necessary purposes—vessels provided with every needful convenience, with skilled medical attendance and nurses, and with fresh food, fresh milk, and fresh fruits—no longer problems since the day of refrigerating chambers, milch cows, and live stock. Thirty years ago the harbors of China and Manila, Rio de Janeiro and Valparaiso were crowded with splendid American clippers, whose commanding officers were veritable princes of the sea, and whose elegantly appointed apartments were capacious enough, after housing their families and guests, to allow a spare stateroom or more for some invalid stranger; but to-day one looks in vain among the great distant seaports of the world for the ensign of an American

merchantman, so that there is little opportunity from this country to make long sea-voyages, save for those wealthy enough to own pleasure yachts which can answer the double purpose of sight-seeing and health-seeking. The carrying trade between Great Britain and Australia, however, requires clipper-built merchantmen of the largest class, whose cabins are nowadays arranged with the very object of accommodating invalids, who have so increased in number that it has been proposed to construct a class of *invalid ships* for their exclusive use ; but there is the same objection to congregating large numbers of sick on board ship as at health-resorts or in hospitals, so that if large, well-ventilated staterooms, bath-rooms, good food, and other comforts can be obtained on board a vessel where there are few passengers, the results will be better than upon a regular invalid ship, where the very air is heavy with studied silence, and where ever-present precaution reminds the sick man that he is manacled by disease. The spectacle of pallid, helpless men and women at Madeira and Nice and similar health-resorts depresses the well and frightens the ill—as the yellow flag of the quarantined vessel causes all the sick to die and all who can get sick to do so, until every possible victim is reached.

The therapeutic agencies which operate upon the broad ocean—rest, pure air, equable temperature and moisture, and the minimum of disturbing causes, are to be found in almost as great degree on the ocean islets, where the sound of rippling springs, the sight of fresh verdure, and the scent of earth replace the monotony of the horizon-bound disk of water.

These islets are dotted over the sea—numerous in Oceanica, where distance and rare opportunities of communication place them beyond convenient and frequent access—less numerous but easily reached in the Atlantic, where midway between the continents they invite the weary broken-down sufferers in mind and body to find rest and sweet oblivious antidote

for all their ills. The Azores, Madeiras, and Canaries are the chief among these "isles of the blest." The former, especially Fayal, about two thousand miles, ordinarily a pleasant fortnight's run from Boston, offer a climate so mild, that one need hardly look for a better, were it not that that better is to be found at Madeira, and a best of all at Orotava on the Island of Teneriffe, one of the group of the Canaries—*Las Canarias* of the Spanish, the *Insulæ Fortunatæ* of Roman geographers, whose mountain peaks stand above the waters like tombstones in this ocean cemetery, where a continent and its millions of Atlantean inhabitants are buried.

The Madeiras are but five hundred miles from the Azores, and the Canaries two hundred farther south, so that the way is easy to that delightful spot, which Humboldt thanked God he had lived to behold—the valley of Orotava, fit garden of another Eden, where he who would begin life anew may find everything save the vice and artificialities and malefic agencies of modern civilization. Twenty years ago I wrote of this spot, what twenty years later I reiterate:

"Here, if anywhere, reigns perpetual spring, without fogs and frosts, where the sap never dies, where rain seldom falls, winds and storm are scarcely known, and burning heat is never felt. Shut off by the high central range of mountains from the hot winds of the African coast, it is yet open to the ocean at the north, from which and the eternal snows above, it derives the moisture that secures its equality. The temperature of Orotava never falls below 50° F., nor rises above 82° F., and only attains these extremes on such rare occasions as when the thermometer marks 108° F. or falls below 0° F. at Philadelphia. Its average for a number of years has been 68.5°F., that of Madeira being 66° F.; of Rome, 61° F.; of Nice, 60° F.; of Pau, 56° F.; and of Paris, 51° F.; the first being identical with that of our own delightful autumn days, and that which is the most grateful to the body and most conducive to its well-being. But annual means are

unsatisfactory indices; countries very cold in winter and hot in summer exhibiting a temperate mean, and it is, therefore, necessary to consider the distribution of heat in each month of the year. The monthly means at Orotava have been for

January	62.2° F.
February	62.1° F.
March	64.2° F.
April	64.6° F.
May	69.4° F.
June	73.8° F.
July	76.5° F.
August	73.2° F.
September	71.8° F.
October	69.3° F.
November	68.4° F.
December	68.7° F.

A difference of only 14.4° F. between the hottest and coldest months, while at London this amounts to 26° F.; at Pau, 32.2° F.; Rome, 28.3° F.; Nice, 29° F.; and Madeira, 15.3° F.

"But it is the winter season which most concerns the invalid, and the mean temperature of the five months from November to March, from the fall of the leaves to the opening of the lilies, at Orotava is 64° F.; at Madeira, 61° F.; and at Nice and Rome, 50° F. The February of Orotava is the June of London, the May of Pau, and the April of Rome and Nice and Cannes. Stoves are necessary for comfort in Italy and the South of France; in Orotava they are unknown. Linen garments may be worn the entire year. The Guanches were naked except for the loin cloth, and one can bathe as well on the 31st of January as on the 31st of July, while at Nice even the healthy visitor finds it necessary to stipulate for apartments opening to the south and exposed to the direct rays of the sun. There are no sudden variations of temperature at Orotava. There is a fraction over two degrees per month of gradual elevation from the winter to the summer and a corresponding decrease through the autumn, and even

these differences may be almost neutralized by removing one's residence from the Puerto on the seashore in the winter to the Villa, a few hundred feet higher, or to any greater elevation on the slope of the Cañadas during the summer. Moreover, the mean temperature of one day seldom differs from that of the preceding more than a degree. On rising in the morning the invalid may be sure of respiring air of the same warmth as on the foregoing day, while the hourly variations of each day are also inconsiderable, the early hours of the morning differing only 6° to 9° F. (at Madeira the difference is 12° F.), from the heat of mid-day, and the most of this occurs before nine o'clock. At Orotava doors and windows may always remain wide opened, maintaining a perfect equilibrium within and without, the advantage of which cannot be overestimated. Here the invalid may live in the open air—the air of the ocean—which is uncontaminated by the thousand emanations of a large city, his feeble lungs, lightened of most of their labor, mechanically discharging their functions and as much at rest as is possible for organs whose only complete repose is death.

"Nor is temperature the only climatal condition in which Orotava enjoys such sanitary preëminence. In point of humidity and exemption from atmospheric vicissitudes it is unequalled by other localities. It rains but forty-five days in the course of the year. At Madeira the average is seventy-three; in Rome, one hundred and fourteen. The mists which bathe the mountain crests, the streamlets that course down their sides from the line of melting snows, the vapors wafted from the ocean, and, when these are wanting, the gentle rains of the winter, furnish that due proportion of moisture which is most agreeable to man and most favorable to healthy life. There is no warring of the elements at Orotava. The barometer stands almost invariably at 30.12 in., and, according to Belcastel, it did not vary a centimetre (0.39 in.) in six months. From February to November a

northeast wind prevails, strongest in March, becoming lighter in the spring, to be all summer and the greater part of the autumn only the breath of a zephyr, setting in regularly about eight o'clock in the morning and moderating the heat of the day. The vapors from the Atlantic are gathered in a thick cloud about half the height of the amphitheatre of the valley, and there held all day, like an immense parasol, intercepting the direct rays of the sun. Days entirely clear are rare, until the gentle rains of the late autumn signalize the disappearance of the clouds and the revival of vegetation. The winter passes without frost, but the white-crowned plateau of the Cañadas, seven thousand feet high, which rims the basin of the valley, and the snow-capped Peak of Teneriffe, towering five thousand feet still higher, denote its presence and add new charms to the landscape. The superiority of Orotava in the matter of hygiene over every other known resort has been set forth by M. Gabriel de Belcastel in his excellent little monograph entitled 'Les Iles Canariennes et la Vallée d'Orotava, sous le point de vue médical et hygiénique,' and his opinion is confirmed by Professor Schacht, of Berlin, in his work on *Madera und Teneriffa*. Madeira approaches it more nearly, as might be expected from its geographical proximity; but the winter of Madeira is unpleasantly chill, its humidity is greater, and the *harmattan* blows upon it from Africa. Nice and Cannes are toyed by the smiling waves of the Mediterranean, but they sleep at the foot of the Alps, and their awakening air has its home in their clouds. Naples is visited by keen north winds, coming after the deceitful caresses of the *sirocco* from the Libyan Desert, and at Rome and Florence the cold is sometimes intense, while they are often deluged by rains."

While it may be insisted that these insular sanitaria are of the earth earthy, however small their extent, their climate, for reasons already stated, is strictly oceanic, since their area is but a speck amid

the surrounding waters, so that for therapeutic purposes they may be regarded as big vessels anchored for a time where the salt sea-breeze may have unchecked sweep across them. The conditions of equability of temperature, moisture, and electric tension, and absence of ochletic poisoning, prevail here even better than on board the ocean steamship, where there is no escape from the greasy smells of the galley and the machinery, the noise of the engine, and the exasperating clatter of crowds of passengers, or on board the sailing vessel, where the contracted stateroom is apt to be befouled by emanations from the bilges.

At Madeira and Orotava the therapeutic agencies are purely climatic. The air, and light, and heat of the sun are the revivifiers. No drug lends its potency to nature's means. The vicious microbe dies for want of food. If medicinal agencies be needed, as for the rheumatic, venereal, gouty, or dermatosic sufferer, these may be found on the island of Sao Miguel, the largest of the Azores, where intensely cold and boiling waters issue, side by side, from the earth and mingle their tides, sulphurous vapors floating continually from the mouths of the hot wells and from the not inaptly termed *Boca d'Inferno* (mouth of hell), or mud crater, which tosses the semi-solid contents, that seldom overflow, about a circle of forty-five feet diameter. Here there are sulphur and saline springs in a benign climate, where the skin may be kept soft and clean, the emunctories active, the lungs filled with pure air, and the stomach with wholesome food, and if meddlesome man will leave the stopples in his vials, the road to health may be regained all the more quickly. An old friend, himself a physician, who had gone to a famous spring because, like the bewailing Psalmist, there was no health in his flesh nor any rest in his bones, and, perhaps for the same reason, complained to me that he was not allowed to depend solely upon the column of variegated salts and alkalies, which the analysts had

strung out to five and six decimal places, but the resident professional brethren insisted upon supplementing a substantial dosage of iodides and bromides that put to shame nature's own infinitesimals.

So, wise in our own conceit, we stand with minim-glass and milligramme, and measure and weigh with dosimetric nicety what perchance nature only disdainfully rejects through her waste chutes—*per vias naturales*. Is it not time to stop and ask ourselves whether it be not the better part to place our patients where, amid Heaven's boundless supplies, the wiser air-cells, and bloodvessels, and lymphatics may themselves select just what they most require—where pure air and water, and good food, cooked to tempt the palate with half the art in making pretty potions to please both eye and taste, shall be the tonics to regenerate the blood till it revivify the worn-out nerves, repair the wasted tissue, and set once more in healthy play the vital machinery which animates and gives the body being? Mere drugs cannot do this, and drugs needlessly, excessively, wrongfully administered, can only retard it. The pharmacist may oftentime be idle, but the therapeutist's task will be no lighter, for climato-therapy requires sound judgment, wise and discriminating adaptation of natural agencies, and the same watchful observation of the grade of action shown by the pulse, the condition of the organic fibre, and the state of the secretions, which are the sum of the physician's duty, however huge his pharmacopœia. If he can preserve tissue from destructive change, keep the emunctories in active play, and control the pulse's fitful beat, he may patiently bide his time for those forces to exert their power, which out of the germinal vesicle make the perfected man — out of the stomach's bole, the blood's living corpuscles, and out of these the sentient flesh and conscious brain. Only the sciolist makes pretence to cure. At our best we are but care-takers. Like children playing with building-blocks, we can pile together a few elements

into semblance of organic compounds, but the sublime mystery of the living cell defies us. When we can recognize just where the departure from normal cell-life begins, and shall have learned how to control the process of assimilation, we shall have conquered disease and put under subjection all but the last enemy—*death.*

THE INFLUENCE OF AN OCEAN ATMOSPHERE ON A STAID POPULATION, WITH SPECIAL REFERENCE TO PULMONARY CONSUMPTION.

By A. N. BELL, M.D.,
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It is a common criticism on the vital statistics of seamen with reference to the salutary influence of an ocean atmosphere, as related to pulmonary diseases, that the subjects are always more or less selected by special examination, as in the recruiting service of the navy; or by the limitations of age, in the merchant service. The object of this note is to rebut that criticism by the vital statistics of a staid population of all ages, dwelling under the influence of what may be considered an intensified ocean atmosphere—the trade winds of the tropics, and almost at the level of the sea.

The population selected is that of Turk's and Caicos Islands, comprising an area of one hundred and sixty-nine square miles, situated between 21° and 22° north latitude and 71° and 72° 30′ west longitude. The greatest altitude is an unoccupied bluff of less than one hundred feet; a considerable portion of the shore is water-logged and swampy; little or no attention is paid to drainage; vegetation is scant; the dwellings are, for the most part, frail structures, almost wholly devoid of sanitary conveniences; there are no sanitary requirements; the whole people seem content to depend upon the forcible atmosphere and abundance of sunshine, for both health and the means of livelihood—the dissipation of foul emanations from the soil, and water from the salt-basins.

The following is an abstract of a copy of official records:

For the ten years 1877 to 1886 the average population of Turk's and Caicos Islands has been 4732; of this number Grand Turk, the only village, extending about two miles along the shore of Turk's Island, contains about 2000. The average temperature for the period has been 83° F. Range of temperature, 75° to 90°. Strong trade winds from east-north-east to east-south-east throughout the year. The weather is never hot at night, except on very rare occasions, when the wind subsides for brief periods. Rainy weather is almost exclusively confined to March and September.

The registration of deaths for the ten years is shown in the table on page 72.

The imperfections of this table, particularly with reference to pulmonary diseases, all grouped together, have considerably delayed the use of the information—intended at the outset for the meeting of the Association a year ago. But Dr. Daniel Bascome, the only physician of the islands for about thirty years, was on a visit to England at the time the record was copied, and as his early return, by the way of New York, was at the time expected, it was awaited, with a view to obtaining the needful detail. He arrived, as expected, but, unfortunately, not feeling well enough to give the subject immediate attention, was soon after taken sick and died of pneumonia.

Notwithstanding, the inquiry has been pursued and the record closely scrutinized by an intelligent observer conversant with it. Mr. Joseph Hutchings, editor and proprietor of the only newspaper published in the islands, writes:

"I have lived in Grand Turk thirty-four years. I think it is one of the healthiest places on the face of the earth. There are over 2000 Turk's Islanders in the different ports of San Domingo, within seventy miles, and two-thirds of the adult deaths are from diseases contracted there, whence they come to their relations to die. I knew every one who died in Grand Turk during the ten years, and, in looking through the records, I am

Deaths registered in Turk's and Caicos Islands during the ten years 1877–1886.

Diseases.	1877.		1878.		1879.		1880.		1881.		1882		1883.		1884.		1885		1886.		Total.
	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	Turk's.	Caicos.	
Pulmonary	11	14	6	3	5	5	7	8	10	8	7	6	12	8	9	5	12	4	10	5	155
Intestinal	6	1	7	1	1	4	3	9	9	6	6	5	8	4	5	9	8	3	7	9	111
Throat	1	...	1	...	...	1	...	2	...	1	2	1	...	...	...	...	...	2	1	1	13
Scurvy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Urinary organs	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	1	...	...	5
Smallpox	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1
Dropsy	1	...	...	...	2	...	1	1	1	1	5	3	2	1	2	...	2	1	...	...	23
Leprosy	...	...	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	3
Senile decay	2	3	3	6	9	4	17	13	12	7	13	8	10	4	10	8	10	9	11	6	165
Infants, under 3 years	29	18	13	23	16	18	23	22	15	9	20	9	9	17	18	15	17	13	15	8	327
Fits	2	...	...	1	...	1	1	...	...	...	...	...	1	...	...	...	...	1	1	1	9
Heart	...	...	...	...	2	...	1	...	...	1	...	...	...	1	...	...	...	...	1	...	6
Liver	1	...	...	...	...	...	...	...	...	...	1	...	1	...	2	...	...	...	...	...	5
Scrofulous	...	...	..	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	2
Cancerous	1	2	...	...	1	...	...	1	...	1	1	...	...	...	1	...	2	1	...	...	11
Spinal	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	2
Fever	4	9	...	3	...	6	7	5	6	10	4	10	4	9	3	3	3	8	3	2	99
Paralysis	1	...	1	...	1	...	2	...	...	...	2	1	...	1	...	...	1	...	2	...	12
Rheumatism	...	...	2	...	..	...	...	1	...	1	...	1	...	2	...	...	...	1	...	1	9
Asthma	1	1	...	1	...	...	1	...	1	...	...	...	...	...	...	...	...	1	1	1	8
Palsy	...	...	...	1	...	...	...	1	...	1	1	1	...	...	...	...	1	...	...	...	6
Accident	...	1	1	3	2	...	3	2	5	4	3	3	2	1	2	8	4	1	3	2	50
Syphilis	..	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Childbed	...	1	...	...	...	...	1	...	...	...	1	...	...	...	3	...	1	2	...	1	10
Total	61	50	35	42	39	40	68	66	60	52	66	48	52	49	56	50	61	48	55	37	1035

satisfied that the number from pulmonary consumption does not exceed three or four yearly."

By reference to the table it will be observed that the number of deaths from pulmonary diseases of all kinds during the ten years was 155. If the larger number given by Mr. Hutchings, 4, annually, among the 553 registered in Turk's Island during the ten years be taken as the approximate proportion from pulmonary consumption in the whole population, the ratio from that disease to that of other diseases of the lungs, will be about the same as the proportion observed in these latitudes—one-half; and the ratio of deaths from pulmonary consumption to the deaths from all causes in Turk's and Caicos Islands, about seven per cent.

Moreover, it is interesting to observe, in this connection, that the proportion of deaths from diseases of the lungs to those of other diseases in the village of Grand Turk is, according to the usual wont of such diseases, considerably larger than in the Caicos—the scattered population.

Of deaths from fevers, on the other hand, the proportion in the scattered population is almost twice as large as that in the village; and Mr. Hutchings remarks, in regard to their prevalence, "very few originate here, except an occasional case of bilious fever. The Islanders who go to San Domingo contract malaria, which, strange to say, kills the blacks without fail; most of whom are young persons."

Of the large number of accidents recorded, the most prevalent is drowning—15 of the 50 registered.

"Eye diseases" are remarked upon as being especially prevalent.

Of the large number of deaths registered "senile decay," more than one-sixth of the total number of deaths, the ages at death range from 65 to 103 years, and average about 74.

Of the deaths registered from infantile diseases, under three years of age, and thirty per cent. of

them under three weeks, the number is not quite twice as large as that from senile decay. Measles, whooping-cough, and thrush are the alleged chief causes.

"Throat diseases," from which thirteen deaths are registered, include bronchitis and, in the Caicos, ulcerated throat. There is no record of diphtheria.

For the rest, the table is sufficiently explicit.

On the whole, it may be remarked, the population of these islands is a staid one to an extraordinary degree and exclusive.

The place has but few visitors, and those for short periods; the sickness and death-rates are not swelled by strangers. On the other hand, these people are generally poor. They rarely leave their homes except from necessity—in search of work—and then as before stated, they visit the less healthful place, San Domingo, where they contract fever. Their occupations and regimen are alike unfavorable to strength of constitution and protection against pulmonary consumption. Yet they are exempt to an extraordinary degree, and the exemption appears to be wholly dependent upon the climatic conditions to which they are exposed.

DISCUSSION.

Dr. H. D. Didama, of Syracuse, N. Y.: Dr. Gihon was so eloquent that nobody can come after him with any expectation of being heard at all. He has lived so much on the sea that he has fallen in love with it. They do not have fever and ague much at sea, so they do not need quinine. They do not have syphilis at sea, so they do not need mercury. I should be inclined to join the ranks of the sailors and go into the forecastle, but I am sick at the very thought of going there. I once went across the ocean. It was in the month of May, and they said the ocean was simply a mill-pond in May. I was sick the first day out, and the captain said, "You will be well to-morrow," and he told me that until we got to Queens-

town. I was sick over, and sick there, and sick coming back, and sick all the time. I am glad the doctor said all those nice things for the benefit of those who can go down to the sea in ships.

Dr. A. L. Loomis, of New York: I do not know as I have anything to add to what Dr. Didama said. All I know is, that Dr. Didama went to sea sick, and he came home and has been well ever since. I have long desired to know just the class of cases that are benefited by long voyages at sea, and I think the first question or the first thing to find out is, if the patient is a good sailor. I have seen many people take sea trips with the feeling—almost certain feeling—that they would be benefited; and I have had them take those trips and get worse during the trip, and in some instances serious symptoms developed as the result of their sickness. So I am not prepared from my personal experience to determine upon the class of persons who should go to sea. I used to think that chronic bronchitis would be benefited by going to sea, but since I have come to learn that bronchitis where it cannot be benefited on land is a tubercular bronchitis, I doubt it. One man goes to sea and is well, and another man with the same conditions steadily loses ground. I have thought that the condition of the air at sea, and the condition of the air in high altitudes, were somewhat the same in their effect, and for that reason I never believed that tubercular patients or phthisical cases could go to sea and be well. But my experience has been against this plan, and I am in doubt as to the class of cases that I can send to sea to be benefited.

Dr. P. H. Kretzschmar, of Brooklyn: Dr. Gihon said that the members of the navy were taken from the healthiest members of the community. At the same time he said that 7800 sick ones were treated in one year by the medical officers. I would like to know the exact whole number of members of the navy to get a proper idea of the beneficial results of ocean climate.

Dr. Gihon: There are about 8601 members in the navy, but the majority of cases of sickness do not amount to anything, and these 7800 represent individual attacks and not individuals.

THE INFLUENCE OF CLIMATE AND SEASON UPON THE MANIFESTATION OF NORMAL AND ABNORMAL NERVOUS ACTIVITY.

By W. B. PLATT, M.D.,
OF BALTIMORE, MD.

When we reflect that all intelligent—that is, co-ordinated—muscular movement, is dependent upon nervous impulses, and that without muscle contraction we have no possible way of manifesting life, much less intelligence, it is evident that the nervous centres should be placed under the most favorable influences to secure the greatest benefit to the individual and to society. The conditions which affect and direct action, are climate, race, and environment. We are, moreover, all aware how large a share climate is believed to have in the production of both race and environment. The individual who is able to rise above the most unfavorable conditions involving all three of these, and excel men of prominence who have attained their position under circumstances the most favorable, may be left out of our calculation. He so nearly escapes the laws affecting large bodies of his fellow-men as to entitle him to be called a genius.

We place *climate* first of all, since it is that which, acting through generations, is believed to aid so largely in establishing race, which helps to alter environment—that is to say, institutions—and which may be in part itself determined by the physical characteristics of the region affected.

We may measure normal nervous activity by the quantity or quality of its products, or, better, by both. To have something tangible we must take the products of a given State and compare them

with those of other nations or states in amount and kind. There is hardly a country in the world where to-day such a comparison is fair unless it be between different portions of our own, making due allowance for such race differences as exist.

This great fact of race difference is constantly held before us as the cause of difference in production. The Caucasian races are more easily compared than others because they alone show a tendency to produce more than they can consume, to an advancement in science, art, inventions, and to constant accretions of capital.

The complexity of the subject is enormous. To single out one factor, such as climate, to measure and weigh its force apart from concurrent forces, would require a volume. The concrete fact, however, remains, that the world over, in cool not cold climates, at moderate elevations above the sea (within 1000 feet) we find in its greatest perfection, that constantly acting, intelligent nervous force which produces greater results in all fields than in warmer or colder regions.

That climate and season have a powerful influence for good and evil upon the organs of respiration and circulation has long been recognized, but that it has also an influence in certain definite directions upon the nervous system has been pointed out by only a few observers and recently, and has been almost lost sight of in the labors of this and kindred associations. The reason is not far to seek, since the relation of cause and effect is not as apparent as in the case of the thoracic viscera, and the difficulty of isolating their effect is greater in the case of neuroses. Some of the visible effects upon the nervous activity of individuals or nations, of climate and season, are only visible after generations or years, others may be noticed in weeks or months.

We must limit our inquiry to a few distinct types of nervous derangement characterized by striking evident phenomena, where we expect to show that a definite causal relation exists between climate and

season and such nervous morbid action as is expressed in chorea, acute polio-myelitis of children, suicidal tendency, and neurasthenia. Here, also, might be included some of the peripheral neuralgias.

Chorea.—In spite of the experiments of Brown-Séquard, who proved that in dogs the choreiform phenomena were probably due to some lesion in the spinal cord, later investigations point to the brain itself as the seat of the disease in man. Without going into the anatomical appearances sometimes found, how fright can be a direct cause of chorea, nor what the real relation of endocarditis to chorea is, we will look into the connection between climate and season to the disease in question. Weir Mitchell's and Gerhard's studies are the only ones where anything more than mention has been made of the subject. They showed conclusively, from a study of 170 cases of separate attacks of chorea, that it is far more common in cool than in warmer climates. In Baltimore, where more than 10,000 cases of all kinds have come under my observation at the Garrett Free Dispensary, I have not had 25 cases of chorea. Of this small number not one was black.

Of Dr. Mitchell's cases the number of attacks increased by an enormous bound from February to March, when it reached its maximum of 35, falling to 15 in April, rising again to about 18 in May, and continuing thus until July, when it slowly fell until December. These all occurred in the latitude of Philadelphia, and extended over a period of four years. The attacks appeared to have no relation to the rise or fall of the barometer, to the rain-fall, or to the thermometer, excepting as the relative rise is greater in the spring than in other months. The number of attacks did, however, show a remarkable coincidence with the number of storm-centres passing within 750 miles of Philadelphia. The observations on this point extended over a period of two years, and the curves of the number of storm-centres and that of the attacks of chorea are almost parallel until the month of September.

As we have already noted that the chorea curve had no relation to that of temperature or atmospheric pressure at the place of occurrence of attacks, we must conclude that some other causes than these are in operation to excite the attacks in question. We might define chorea as a disease of childhood and youth, characterized by chronic, intermittent, muscular twitchings, without loss of consciousness, often accompanied by endocarditis, and caused by an irritation of the cerebral motor ganglia. It is a disease of cities rather than of the country, of whites rather than of blacks, of females rather than of males, of the spring months, and of cool climates.

Dr. J. K. Mitchell informs me that he investigated the relation of attacks of *apoplexy* to season at one time, expecting confidently to find some relation. He found, however, nothing in the least to indicate that any connection existed between them.

In regard to *acute polio-myelitis* of children, or *infantile paralysis*, Wharton Sinkler, of Philadelphia, found it immensely more frequent in that city in the hot than in the cooler months. The curve of the number of cases rises rapidly from May to the first part of August, falling abruptly to the first week in September, running then in an even course until November, when it fell to its lowest point in December. While its curve does not run exactly parallel to that of the temperature, the main course is very near it. Just as in cholera infantum and the diarrhœal diseases of children where the mortality and the degree of heat are closely related.

Concerning *suicide*, we see at a glance that race has much to do with its frequency. Those who believe that race and the peculiarities which cause the difference in races, are due to climate, will find support in the fact that negroes, for instance, very seldom commit suicide; carrying into cooler climates a peculiarity acquired by residence for many generations in a hot climate.

Savages have such an immunity from suicidal impulse, that we may in general define it as one of

the diseases incident to civilization, one of the throes of the human race, painfully passing through stages of evolution which bring with them burdens too heavy to be borne.

The influence of climate and season upon suicide is most remarkable. S. A. Hill, in his *Statistics of an Indian Province*, shows that suicides, violent deaths, and wounds, are at a minimum in the colder months, increase in frequency during the hot and dry season, and remain high during the rainy season. The irritability of temper caused by prolonged heat and moisture is suggested by him as a reason. The same writer says that December is the month of most frequent conception.

The literature of suicide is enormous, as anyone who looks up the subject for any point connected with it will see. Dr. Pilgrim, in the July number of the *Popular Science Monthly*, says, "Suicides are most frequent in April, May and June. July and September have a good proportion, while they are fewest in October and November." M. Guerry is quoted as proving that some days of the month and week and some hours of the day are more often chosen than others for suicide. He found the greater number occurred during the first ten days of the month, due probably to the fact that wages were then received and spent more often than later in the month; their receipt being followed by dissipation, reaction, and self-destruction. There were likewise more cases occurring from Monday to Thursday. A French writer on the subject, Brierre de Boismont, shows that of 1993 suicides in Paris, most of them occurred between 6 A. M. and noon; thereafter regularly declining in frequency until just before sunrise. They are also said to be especially frequent shortly before breakfast-time, and very seldom just after dinner.

There are also epidemics of suicide due to social causes, which might as well be called "social nerve-storms." In Versailles, for instance, there were in one year 1300 suicides. The statistics of lunatic

asylums show at certain times a much larger number of admissions of patients with suicidal tendencies than at others. Dr. Pilgrim quotes from the report of the State Lunatic Asylum of New York, showing that in July, 1850, there were admitted 28 suicidal patients. In that month, of 44 patients altogether admitted, 19 of them were suicidal. From the 12th to the 22d of the month there were 14 attempts to commit suicide among 8 persons.

To estimate correctly the influence of any one element, such as climate or season, we must see what other factors there are and eliminate these if possible. A recent writer, in an article entitled "Baits for Suicide," deplores the influence of a certain class of literature upon those likely liable to suicidal impulses, and dwells particularly upon two well-known works of fiction, *Lady Audley's Secret*, and *Aurora Floyd*.

One factor is age. Forbes Winslow (*Journal Psych. Medic.*) shows that the tendency to suicide first appears at from 10 to 15 years of age, is most frequent among males from 55 to 65, and among females from 65 to 75, in Great Britain. An imperfect education appears to be worse in its suicidal tendency than ignorance. Whatever we may think of the proverb that "Ignorance is the mother of devotion," we cannot call suicide a child of hers, since suicide is absolutely less prevalent among the illiterate than among those who are more or less educated. Radcliffe, in "English Suicide Fields," etc. (*Journal Psych. Medic.*, vol. ii.) holds that nowhere is this relation of suicide to ignorance more manifest than in Great Britain; being more prevalent in the more highly educated districts. Farr attributes this with justice, not to the advancement of science and knowledge, but to the development of small trades, such as that of tailoring, shoemaking, and the like.

Sex is another important factor. In New York, in 1883, there were 161 suicides; of these, there were 134 males and but 27 females. Nationality

plays a curious part, for of these, 70 were among the Germans, who, as far as worldly prosperity is concerned, are more prosperous than the other great immigrant class, the Irish. Religion and the lack of it have an important bearing. Except among the absolutely insane, a belief in a future life of reward or punishment, exerts a decided restraining influence on the tendency to suicide. Without this, suicide is a logical and welcome means of escape from hopeless despair, misery, or disgrace.

Well-marked insanity is another and with us the most important of influences in producing suicide, although, as we shall see, this in turn is greatly influenced by climate. In England, in 1865, there were 1600 suicides; most of these attributed to insanity. How many more there might have been may be seen from the fact, that during this year there were in insane asylums 6096 patients with suicidal tendencies. The English believe that most of their suicides are to be found among the insane, and fewer due to despair, remorse, and sense of disgrace, which act as powerful motives on the Continent. Aside from well-marked insanity, in the popular acceptation of the term, the passions are the most important direct cause of suicide. Imitation is a most important exciting element in suicide. The mere mention of some remarkable or striking mode of self-destruction, is sure to be followed by a number of similar cases over a large area, and this area would, we believe, be found to correspond pretty closely to the region reached by the newspaper account of the case in question. It is well known that melancholic insane are the most suicidal in their tendency. In four years there were 2106 patients in the Utica Asylum for the Insane. There were 512 cases of melancholia, and of these there were 130 suicidal patients, or 35 per cent. This is about the usual per cent. There were but 50 cases among the remaining inmates.

Among suicides from disgrace, military sentiment, etc., may be mentioned the case of the son of the

famous Marshal Wrangel, who, finding that his son, an officer in the army, had utterly lost caste in consequence of his misdeeds, paid all his debts, and said "Now there is but one thing further for you to do, you will find what you need in the next room," referring to a loaded pistol which he had laid upon the table, and the son, truer to military tradition at last than at the first, took the hint without delay. The instance of Rudolph of Austria is too well known to require further comment as a result of passion and mistaken sentiment. When, however, we take large areas among various nations and find that suicide is far more common in cool than in warmer climates, we are compelled to admit that climate is one great causal factor. Explain it as we will, call its influence direct or indirect, there are far more suicides in northern than in southern countries. Dr. Grissom, of North Carolina, in whose asylum there are on an average 200 insane, has never had a suicide, and we think no one would venture to believe that institutions for the insane have better management or attendance in the South than in the North. He (Dr. Grissom) is said to have attributed this remarkable immunity to the restraint system. The statistics of the Maryland Hospital for the nsane, near Baltimore, whose able and intelligent Superintendent, Dr. Gundry, has long since abolished restraint, and where there are at present 430 inmates, with an average of from 350 to 400, for five years, has had but one suicide in ten years. It may here be said in respect to nationality that negroes, in spite of their hopelessly inferior social position, and who seem condemned to servitude, if not hard labor all their days, seldom destroy themselves.

It is the testimony of numerous observers—Quetelet, Tissot, Winslow-Hawkins, Gundry—French, English and American, that suicide is more common north than south, and more common in warm than in the colder months. Of the warmer months, the

months of April, May, and June certainly predispose to or excite to suicide.

The fact that more cases of the so-called *neurasthenia* occur in the spring months, than at any other time of the year, must be evident to every general practitioner or specialist who has to do with the class in which these cases arise. Those students who habitually omit to take arm exercise, furnish a large contingent. I have seldom seen a case of neurasthenia in a man who kept reasonable hours, avoided excess of stimulants, narcotics, or sexual indulgence, and who took some form of regular arm exercise.

Such a man will become so fatigued when he enters the confines of mental overwork as to be incapable of it. We find those who are ill-balanced morally, by far the most sensitive to influences that the normal man easily withstands.

The Elmira Reformatory, of New York, with its 1000 inmates between the ages of eighteen and thirty—all criminals—is a fruitful field of observation of nervous instability, and I cannot improve upon the remarks of Dr. H. D. Wey, who has kindly replied to my inquiries as follows:

"It is a well-known fact that 'nerve storms' or ascending nerve currents are encountered every spring. There is no fixed time for their appearance, although they usually manifest themselves either in February or March. This year they appeared in the latter part of January. Whether there is any connection between their early manifestation and the unusually forward spring, I cannot positively say; but reasoning inferentially, it would seem as if there was.

"The old saying runs, that 'In the spring of the year the necks of the bucks begin to swell.' It is very seldom that our annual attack of 'cussedness' comes on as late as the month of April. It seems to occur coincident with the renewal of life in the vegetable kingdom and has never been noted in any degree during the decline of vegetation in the fall. It manifests itself in irascibility, and a disposition to break in upon and infringe the rules of discipline. The animal nature seems to come to the front. Two men may be working quietly side by side, when without any provocation, one man will fell the other to the ground, possibly inflicting serious injury.

"Assaults upon officers are more common than at any other season. In 1880, there were two suicides and two homicides, all within a period of two months. There seemed to be no other reason for the tragedies than that they were the outcome of the nerve tension incident to the season of spring. At this time it is necessary to observe unusual vigilance. None recognize this fact better than old officers. School-work seems to drag, and it calls for unusual effort for the men to apply themselves to their mental tasks. Shop-task work is performed with greater difficulty and frauds in its execution are constantly cropping out. Such, in brief, are the phenomena noted in general. In the individual can be studied the conflict going on between two natures; a Dr.-Jekyll-and-Mr.-Hyde contest, in miniature.

"In everyday life, *Monday* morning is the most troublesome period of the *week*. The quietude of Sunday, the absence of customary duties, and the communing of each man with himself seem to bring to the surface on the following day all that has been held back and repressed during the week. In view of this it is sought to impose upon each man as much Sunday occupation as is consistent with the day, religious services for all denominations, Protestant, Romish, and Hebrew, examinations in English literature for the most advanced, popular talks and lectures by the best talent we can obtain. All that is emotional or that appeals simply to sentimentality is avoided, and for this we have been criticised as Godless.

"Regarding insanity, I cannot say I have noted its presence to a greater degree in the spring than at any other season of the year. When it does occur in the spring it would seem as if it must be looked upon as the giving away of a mind that is non-resistive, and unable to participate in the strain to which the nervous system is being subjected. I have noted that with a rising barometer the men are buoyant and elastic, and perform their tasks without seeming effort and irritation; but when it is falling or depressed, they seem sluggish and heavy, and respond badly or slowly to stimulation.

"I omitted to mention that during the spring 'climacteric' the proddings of sexual disturbance are apparent. Many of the men will have sexual sprees (masturbation) that bring them to a conditon resembling that of the 'fretful porcupine,' when they are in a condition to cast their quills at any one who may provoke or cross them. These sprees may be compared to the outbreaks of the paroxysmal drinker who carries his excesses to a point where the nervous system gives way under the strain and fails to assist him in his dissipation. A man will masturbate to that point where he is in a tremor, unable to eat or sleep, and on the border-land between sanity and insanity. Then we will have to take him in

hand, and build him up as would be necessary in the case of a man recovering from an attack of alcoholism. These cases are, however, occurring at all seasons of the year."

If then we have shown that neurasthenia and suicide are more frequent in certain months of the year in various countries than in other months, when *á priori* they should be more frequent, shall we then conclude that temperature or its variation has anything to do with it? We are compelled to say that we do not think it has of itself much to do with the outbreaks or epidemics which we often see at this time. Moreover, we must further say that we believe no one knows what these influences are which disturb the equilibrium of the emotional nature. All we have been able to do is to call attention to the fact that climate and season do have a marked influence upon the manifestation of nervous activity in the various ways already indicated.

DISCUSSION.

Dr. Willis E. Ford, of Utica: This subject is one of such magnitude that to go into detail into the arguments which Dr. Platt has so carefully brought before us would take too much time. I had an experience in a lunatic asylum. I cannot say that I noticed any differences there in the temperament of the patients brought about by weather. It is true that when they are confined to the house they are more troublesome. That is also true of sane people. I do not believe that we are justified in saying that the production of suicides is due to the social condition of the people. It is true that the majority of suicides in New York City are foreigners. Dr. Platt admits that cases of suicide are more numerous in the fall than at any other time of year, and it is supposed to be due to the hard work of summer and to the fact of malnutrition. In an asylum which is surrounded largely by a farming district the influx of patients at the end of the haying season is very notable. There is a great deal of difference as to climatic conditions and

as to changes of season. I am in a region where the hard months are the months of April and May, in which I see more chorea than at any other time of the year. I should hardly like to subscribe to the theory that climate has anything to do with the suicidal tendency in man.

THE PINE BELT OF NEW JERSEY—A REGION OF SANDY SOIL AND PINE FORESTS.

By ISAAC HULL PLATT, M.D.,
OF LAKEWOOD, N. J.

New Jersey, though a small State, presents a diversity in its topographical and geological features. In the northern portion it is traversed by the Kittatiny and Highland ranges of hills, parts of the great Appalachian chain; the central portion is characterized by red sandstone with trap ledges, while the southern and eastern part of the State consists of level country, with a sandy soil and pine forests. Along the shore there are long stretches of shallow bays and tide marshes, and in the extreme southern portion many little rivers with wet meadows lying along their banks, but running through the interior of the State there is a strip of land about sixty miles in length and from eight to twenty miles in breadth, reaching from a few miles south of Freehold, in Monmouth County, almost to Vineland, in Cumberland County. This comprises the inland portion of the sandy tract, excluding the extreme southern portion, of which I have spoken as being damp. This region has long enjoyed a local reputation for healthfulness, and some portions have been mainly settled by people who have sought it for that reason. Its soil varies somewhat in its character, ranging from a light sandy loam to clear beach sand. Its streams, which are sufficient for drainage, have good banks which they very rarely, if ever, overflow, and there is no wet meadow. There are a few peat bogs which have been partially utilized in the cranberry culture, and also some marl beds in the northern portion, and occasionally a cedar swamp, but these

features are all of very limited extent. Leaving these out of account the richest soil is a light sandy porous loam, containing about 85 per cent. of silica and only 1½ per cent. of water, while the lightest is almost pure quartz sand, 95 per cent. silica and only 0.6 per cent water.[1] Extensive pine forests are a prominent feature of this region. They have been in some places cut off or burned, and in some spots are replaced by oak and other deciduous trees, but there are enough left to make it pre-eminently a pine region. One consequence of the sandy nature of the soil is the entire absence of mud. Of course, during a rain or a thaw there is wet sand, but it is no more like mud than the wet sand of a sea beach, and within a few hours after the cessation of the rain it is dry again. Melting snow does not produce slush, except in rare cases where the snow has immediately followed a freezing rain, as the dry and thirsty soil drinks up the water as fast as the melting of the snow can produce it. I have seen eight inches of snow disappear so completely in twenty-four hours that one could walk out, "across lots," with thin shoes without moistening the feet. Owing to the coarseness of the sand there is no dust, except a slight amount in very dry weather where the roads have been covered with clay or gravel.

The importance of soil dryness as a climatic element in the prophylaxis of phthisis is too well known to need rehearsal. The researches of the elder Bowditch, Buchanan, Simon, Pepper, and others are familiar. Why soil dampness should have an influence in the production of phthisis, so out of proportion to dampness emanating from other sources, I have never seen satisfactorily explained, and it is not my purpose to attempt its explanation, but I think some figures from the vital statistics of New Jersey will help confirm the fact if any confirmation is needed.

The tract which I have described, comprising

[1] Cook's Geology of New Jersey.

parts of the counties of Monmouth, Ocean, Burlington, Camden, and Atlantic, is coëxtensive with the townships of Howell, Jackson, Manchester, Southampton, Woodland, Shamong, Winslow, and Hammonton. In all, about 570 square miles, containing a population, according to the State census of 1885, of 14,475. According to the reports of the State Board of Health, which are carefully prepared and I believe as accurate as any statistics of the kind, the whole number of deaths in these eight townships during the six years from 1883 to 1888, inclusive, was 1057, or an average of 12.16 per thousand, a year. The number of deaths from consumption was 141, or 1.6 per thousand, a year. In the State of New Jersey, during the same period, the total mortality was 18.65 per thousand, and the mortality from consumption 2.53 per thousand, or, throwing out towns of over five thousand inhabitants, the total mortality was 15.07 per thousand, and the mortality from consumption 2.12.

	Total mortality per thousand.	Mortality from consumption per thousand.
Sandy tract	12.16	1 60
N. J. State	18.65	2.53
N. J., excluding cities . .	15.07	2.12

The comparatively low mortality from consumption will be rendered more striking if attention is called to the nature of the population of the region. The inhabitants may nearly all be included in two classes: the descendants of the original settlers and those who have sought this region because of its supposed healthfulness. Probably owing to the sterility of the soil, the native south Jerseyman is very poor; he resembles in many respects the poor whites of the southern States. He can in many cases neither read nor write. His surroundings are as unhygienic as poverty, ignorance, and lack of ambition can readily make them in a naturally healthy region. His home is a hovel and his food indigestible, and often insufficient and innutritious.

Of course, there are exceptions, but this is the rule. Both this class and that composed of people who have come because they were in feeble health would naturally be supposed to raise the death-rate from phthisis.

The comparison with the rest of the State of New Jersey I regard as of greater importance than that with any place else, because the statistics are compiled under the same general direction and under the same rules and conditions; but it will, perhaps, be interesting to cite for comparison a few other death-rates from phthisis:

New York City	3.56
Philadelphia	3.16
Brooklyn	2.98
Boston	3.34
San Francisco	3.06
Massachusetts	2.90
New York State	2.50
London	3.20
Rural England	2.30
Switzerland	1.80
Rural Victoria (Australia)	0.87

It is to be regretted that no systematic meteorological observations have been made in this region. The nearest approach is the record of Vineland,[1] just south of the region described and in quite similar country. This for ten years from 1878 to 1888 is as follows:

Barometer, reduced to 32°,	
Mean	29.92
Maximum	30.76
Minimum	28.65
Thermometer,	
Mean	53.60°
Maximum	104.00
Minimum	—10.00
Mean relative humidity	72.2
Rainfall per annum,	
Mean	47.41
Maximum	59.99
Cloudy days, average	107.00

[1] Vineland is almost identical in its physical features to the region under consideration. The reason of its exclusion is the existence of a strip of damp soil between.

There is nothing very striking in this table; the mean relative humidity is moderate, therefore the climate cannot be classed as very dry. In spite, however, of the fact that by the tables the humidity does not differ materially from that of New York or Boston, the sensation of dampness is far less. In winter, the peculiarly disagreeable weather accompanying an east wind in our seaboard cities, and known as "raw," is almost unknown, and in summer, while the weather is frequently warm it is rarely sultry. The east wind even in winter loses its disagreeable character which makes it a bane to the Bostonian and New Yorker, and in warm weather is the pleasantest wind we have, coming as it does with the freshness and coolness of the sea, but deprived of its dampness by the stretch of sand and pine forest over which it has passed. Fogs are very rare. In a three years' residence at Lakewood I have not seen more than five or six, and these were dissipated a few hours after sunrise.

The village of Lakewood lies near the western border of the township of Brick in Ocean County, ten miles from the sea. It is not included in the region to which the statistics given above apply, because it is part of a statistical division extending to the seashore, and also because a large proportion of the deaths there are of patients from a distance. It is, however, practically a part of the region described, being within a mile of its border and identical with it in soil and climate, and is the only place thereabout where good accommodations can be found for sojourners. The elevation of the village above the sea level is from sixty to a hundred feet, it being situated on the southern slope of a low ridge which forms a shelter from the northerly and northwesterly winds.

On the north and west the village streets terminate in the pine woods which, with an occasional clearing for farming purposes, extend several miles northward and indefinitely to the west. To the south and east the country is more open, but a large portion is still

covered with pines. The town is furnished with water from the Metedeconk River, which flows just to the south, and is supplied with a good system of drainage.

There is one feature of Lakewood which has not yet received the attention due it, and in fact the existence of which I have only recently become aware, and that is, a very remarkable spring about a mile from the village. It is of the class of the Poland and Bethesda springs, and has an estimated flow of from sixty to ninety gallons per minute. The following is its analysis:

Total solids . . .	grs. per gallon,			1.0260
Silica	"	"	0.2098	
Sodium chloride . .	"	"	0.4431	
Ferrous sulphate . .	"	"	0.1107	
Calcium sulphate .	"	"	0.0495	
Calcium chloride .	"	"	0.0058	
Potassium chloride .	"	"	0 0220	
Magnesium chloride .	"	"	0.0547	
Mineral residue . .	"	"		0.8956
Organic and volatile matter	"	"		0.1304

The analysis of the Poland spring I will give here for comparison:

Total solids . . .	grs. per gallon,			3.6759
Sulphate of potassium	"	"	0.1562	
Chloride of sodium .	"	"	0.2636	
Carbonate of sodium .	"	"	0.1333	
Carbonate of lime .	"	"	1.2287	
Carbonate of magnesium	"	"	0.5412	
Oxide of iron and aluminum	"	"	traces	
Silica	"	"	1.1197	
Organic and volatile matter	"	"	0.2332	

It will be seen that in the quality of purity the Lakewood spring excels the Poland spring by more than three times. Accepting the views of the profession as to the value of pure spring water in the treatment of Bright's disease, as epitomized by Dr. Andrew H. Smith in his paper read before the Climatological Association last year, and in view of the undoubted benefit of the water from the Poland and other similar springs in these cases, the value of this spring can hardly be doubted. I have not yet had

an opportunity to put this theoretical opinion to a clinical test, but I shall do so as soon as possible, and in view of the exceedingly clear course of reasoning by which Dr. Smith reaches his conclusions in the paper referred to, and of experience with water of similar springs I have little doubt of the result.

It is not my intention to enter into any comparison of this region with more famous health resorts. I certainly believe that the high altitude of the Engadine or Colorado has positive advantages which places near the sea level cannot possess; but there is a long list of contra-indications to the high altitude treatment, and there are many patients who cannot avail themselves of it for various reasons. To such our region offers a refuge with the very decided advantages of an exceedingly dry, porous soil, the environment of pine forest, good accommodation and easy accessibility from the great centres of population. It is most admirably situated for carrying out the idea advanced by Dr. Bowditch at our meeting last year, of residence in comparatively favorable regions near at home, where sanitaria might be established, and climatic, medical, and hygienic treatment combined without the necessity of a distant exile.

As some future time I hope to be able to give something more definite in regard to the results of treatment in this region, but as yet my observations are not sufficiently extensive or long continued. I can only say at present that it is very exceptional for a patient with bronchial or pulmonary disease not to derive some benefit greater or less from the change, and in many cases the benefit has seemed remarkable.

THE PSYCHOLOGICAL FACTOR IN SELECTING A CLIMATE FOR INVALIDS.

By EDWARD O. OTIS, A.B., M.D.,
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"THERE is between the condition of the mind and that of the body," says a modern novelist, "an inter-dependence which cannot but be recognized by every physician." Recognize this fact we do, but I am inclined to think that we give less practical weight to it in our treatment of disease than we ought or might with profit to our patients. To adapt best the remedy, be it climatic or medicinal, to the case in hand, the psychological side of the question, as well as the physiological and pathological, must have its due consideration. Mental influences produce an infinite variety of bodily effects, from an anorexia to a *de novo* phthisis, insanity, or death even. In such a serious matter, then, as a change of climate for a less or a greater period, involving frequently a breaking-up of social and family ties, much more careful attention, it seems to me, should be given to the mental peculiarities and bias of the patient than often, apparently, seems to be the case.

If the *sana mens in sano corpore* is capable of infinite variations, how much more marked are the vagaries of the mind disturbed from its equipoise by the perturbing influences of bodily disease. How often this is illustrated in phthisis we all know. Peculiarities hardly noticeable in health are exaggerated in disease. Every person when sick is more or less of a child, as most of us from personal experience have realized, often to our surprise and chagrin. From a psychological point of view, then, we ought, it seems to me, to consider various factors when a

change of climate is contemplated for an invalid, whatever the malady may be. In a general way they are these: *First.* The temperament or mental disposition. Is the patient naturally buoyant and happy, or, on the contrary, often depressed and inclined to take a Mantilinian view of life? *Second.* Previous habits and mode of life. Has the patient been active, fond of society, used to much excitement and frequent change; or lived a quiet, equable life, like the peaceful one of the country? *Third.* The amount of physical activity to which the patient has been accustomed. Has he led more or less of an outdoor life; does he have a fad in shooting, fishing, and the like; or is he of sedentary habits, devoted to books, art, or what not? *Fourth.* The matter of domestic ties. In the contemplated change will the invalid be compelled to sever close ties of relationship—a wife to be separated from her husband, a child from its parents, a mother from her children, etc.? *Fifth.* Is the patient to be placed in an environment of invalidism, where he will have his malady suggested to him continually, by seeing others sick and dying with it about him? *Sixth.* The age of the individual.

That it is important to consider all these elements, in selecting a climate for those patients whom we advise to change their skies, is obvious enough, I think; for that climate is the ideal one for the case in hand which best is adapted to his especial needs and conditions, even if it does not possess all the elements of an intrinsically ideal climate. Better a little less altitude and an agreeable environment; or more moisture, with an opportunity of indulging in one's pet hobby; provided always that the point yielded in the climatic conditions is counterbalanced by the point gained in mental contentment.

An analysis of that bundle of peculiarities which constitutes what we call one's temperament is no easy matter, and still, it seems that it ought to have careful study when a change of climate is under advisement. Here, for instance, is an individual

who is a veritable melancholy Jaques, always thinking that the days are waxing evil and he with them, who has a "melancholy of his own, compounded of many simples, extracted from many objects." In ordinary health it requires the combined efforts of his friends and family to keep him in tolerable spirits. Once let him fall sick and he apprehends a speedy dissolution. Such a man is an unfortunate patient to deal with under any circumstances. When the matter, however, of climate comes up we should rather send him to a place of varied interests and attractions to divert and amuse him as much as possible, than to a Colorado ranche or an Adirondack village in winter. Another person, on the contrary, possesses one of those happy, sunny dispositions capable of extracting pleasure from all the little incidents of daily life. Such a one will content himself almost anywhere; and to whatsoever climate you decree him, there he will find a tolerable amount of contentment and happiness. When once he has conquered his nostalgia, you can venture to send him to such places as you would not dare to suggest to the former man.

Between these two extremes we have every variety of disposition or mental attitude, either natural or as a result of the malady. Of course, it is a delicate question and one requiring much consideration how much weight we should give to this factor in our decision. The nervous, excitable person is often best consigned to a quiet, restful place, and the contrary is often best for one of phlegmatic nature, for to give him an interest in something may be the most important step toward his recovery.

One's natural disposition, to a great extent, shapes his way of life and determines his habits. Environment and intercurrent circumstances, however, are important elements, as we know, in the matter. We have only to consider, however, the mode of life as it exists when the patient comes to us, and to settle the amount of its influence in determining the kind of place and climate best for him. We are all

creatures of habit, and so strongly and firmly bound by it, and yet so unconsciously, that we only realize it when we attempt to change or break the chain. Take the most familiar illustration, a business man accustomed for years to a daily routine in a city. Resources outside of his business he may have few or none—no hobby or favorite outdoor amusement. Send him away to a lonely place, or to any place, indeed, and he is wretched, the habit of his life is broken, and he realizes how strongly he was bound by it. If, however, it is possible to place him in a sufficiently favorable climate for his disease, and at the same time allow him to continue to some extent in the way of his former life—if, also, the malady permits it—for instance, sending a phthisical merchant to Denver, El Paso, Los Angeles, or where you please, and there indulge him in the semblance at least of following his former occupation, then, it seems to me, we supplement greatly the beneficial effects of the climate by the contentment of mind the continuance of his former habits of life gives.

Or, again, take a young woman, city bred and accustomed to much variety of life in the way of amusements and social diversion. It may be the wisest plan to send her to a place with an environment the reverse of all this, where the life is the simplest and most peaceful conceivable, like that of a western ranch or a small southern village. Assuredly it will be if she is suffering from neurasthenia. It may be, however, that to continue a limited amount of the old excitement, if I may so term it, may keep her in better mental equipoise than suddenly cutting it all off. Denver, St. Augustine, Fortress Monroe, Cairo, the Riviera, may be more curative for her than the quiet, isolated life of a mountain hamlet or a New Mexico ranch.

The tastes of a patient play a not insignificant *rôle* in his physical condition and well-being, and a disregard of them may vitiate the good results hoped for by the climatic change. Here, for ex-

ample, is a person devoted to music; it may be that this very devotion is the cause of the phthisis or neurasthenia. Deprive him, however, of all opportunity of hearing a sonata or a symphony now and then, and he is wretched. Send him, on the contrary, to a resort like Colorado Springs, for instance, where he can gratify his taste occasionally, and in addition allow him his piano, with proper restrictions, and he will be happy, and far more readily and quickly adapt himself to the new and changed conditions.

Or, another is a botanist *con amore*. For him a place with a large and varied flora, such, for instance, as some portion of the Rocky Mountains or Southern California, will be more attractive and consequently more beneficial than a sea voyage or Davos. And so, in brief, by studying the tastes and inclinations of the invalid to be exiled, as good a climate may be chosen and in addition a point gained by the greater contentment the favorite occupation or amusement affords.

Here I will digress long enough to say that for these reasons, as well as others more directly climatic, it seems to me that it is of the greatest advantage for the physician, who frequently has to advise his patients where to go for a different climate, to have visited as many of the resorts as possible. He may not, probably will not, remain long enough to make any extended study of the climate itself. This has generally been done by the resident physicians, but he will—which will be of great value to himself and his clients—have found out the resources of the place, its attractions, amusements, the class of people his patients will be thrown with, and all the little data and detail as important in their way as the purely climatic side of the question.

The matter of length of residence in the climate selected depends on many considerations, principally on the kind, character, and extent of the disease. I shall only touch upon this subject here in so far as it relates to the psychological element involved. In

maintaining a healthy mental equilibrium, so far as this is possible with an invalid, the diversion of change is a powerful factor. Some physician has said—I have forgotten who, that the invalid should change his residence every month, and there is much of truth in the saying. Now, within the area of prescribed climate a frequent change can often be attained. For instance, a patient who has had selected for him the climate of eastern Colorado, can change Colorado Springs for Santa Fé for a little time in the winter, and in the summer go up to the Estes Park or some of the many other mountain resorts, breathing all the time the same kind of air. Or, again, one who has had prescribed for him a mild sea air may vary the localities where he finds it. St. Augustine, Fortress Monroe, Santa Barbara, or a sea voyage about the West Indies, all afford him his specific climate with the diversion of change and variety of scene. Moreover, these changes can frequently be made within a limited area, and with no great exhaustion from lengthy journeys, or large expense.

The manner of life as to physical activity is another and important factor, looked at from a psychological standpoint, in the selection of a place for one's patient from amongst those climatically proper for the case in hand. Some individuals will be active as long as the breath of life remains in them, and when wisely regulated, and excess is restrained, it is often better that they should continue to be so, even in their invalid state. Better let a mountain climber or a fisherman take some risk and climb and fish a little, than to wear out his life in desponding *ennui*. I recall the case of a poor fellow with advanced phthisis whose hollow cough kept the ranch awake at Estes Park, and who would still persist in his favorite amusement of trout-fishing whenever he was able to drag his emaciated form to the streams. When I left the Park I expected that a few weeks would see the end of him. What was my surprise to learn that he was still fishing there the following

summer, and I trust that he is still somewhere whipping the brooks and so prolonging, not altogether unhappily, his precarious existence.

Those, on the contrary, accustomed to sedentary habits, as so many women are, and not a few men, it is more difficult to indulge safely in their proclivities; for a change of climate, for whatever disease, requires a more active life generally than the one they have been leading; nature, however, reasserting herself, aids us in this, for, in the natural state, man, like most other animals, is an active creature, and it is only the artificial caging that contravenes nature's law. While, then, the old order is changing, reverting to the normal, we can temporize a little to the benefit of the mental state by allowing something of the old life to continue, changing, if we can, the method and manner of it.

For instance, we can send a man given to historical research, and who spends much of his time in his library, to Santa Fé or to the old mission towns of Southern California, where he can investigate the bygone history of these old places, rich in the fascinating tales of Indian missions and self-denying padres. Naturally, in doing this he will be much out of doors and more or less active. So you gradually change his previous mode of life and indulge his mental inclinations.

Or, again, it is a woman who has too assiduously devoted herself to charitable work. Her work has become almost her life, and to separate her from it entirely is to destroy her aim and object in life. If she goes to Aiken, let her gather a class of colored people about her to teach a little, or visit them in their cabins à la friendly visitor. Or if to New Mexico, let her look up the Indians. So, again, you keep alive hope and interest in life, which, in its turn, keeps alive the body.

The separation of families and of intimate friends for a considerable period of time is a serious obstacle to the kindly influences of a healing climate. In cases where the social and family ties are of the

closest, and the dependence of the patient upon those about him is great, it is a question in my mind whether enough is gained, by sending him long distances to some of the standard climates, to compensate for the loss entailed in mental stamina by the shock of the separation. In certain cases which have come under my observation, where, for instance, a wife has been sent from the east to Colorado, and could see her husband but once a year, or a daughter or son sent away from the rest of the family, it has hardly seemed to me that the climatic gain compensated for the loss of that peace and contentment of mind so essential for favorable progress in any chronic disease. Of course, individuals vary much in the manner of adapting themselves to circumstances and the inevitable. Where, however, the longing for the dear ones at home is extreme and continued, a spot nearer home with a climate less intrinsically ideal for the disease, but affording easy communication with the home friends, may accomplish better results; as, for instance, Sharon, in this State, or Lakewood, in New Jersey. Often it can be so arranged that members of the family can accompany the invalid, but sometimes not, as in the case—not infrequently arising—of a wife whose husband is confined at home by business or professional life, and upon whose labors the very ability to enjoy the new climate depends. Most people, it seems to me, hardly realize the shock which the separation from friends and familiar scenes produces, especially upon those of middle age, and upon those who have few resources within themselves. If a certain climate is considered a *sine qua non*, then it would seem wise in such cases to insist upon certain of the home friends accompanying the invalid, or, better, the whole family. The roaming life of the prairie schooner class, where the whole household go along, has other advantages besides its idyllic character; they carry home with them.

An environment of invalidism is almost inevitable

in most of the well-known health resorts. Besides its injurious influences in other respects, mentally it is in many ways unfavorable. To be sure, calamity in a way makes us all akin, and in thinking of and helping an unfortunate brother our mind is diverted from our own misfortune to our benefit. On the other hand, however, to be amongst many others suffering from the same disease as ourselves, in its varying degrees and phases, must often react unfavorably upon our own condition. Our disease is kept constantly before us; and I have noticed that a community of invalids seem morbidly eager to discuss their own symptoms, and learn to watch and note the smallest variations in their condition. When thus the mind is kept constantly upon the disease, the progress is naturally less favorable. Again, death must often occur in a community of invalids, which reminds, most emphatically, the survivors of the uncertainty of the issue in their own case. So the dread and doubt are kept constantly before them, and their mental attitude is anything but one of peace and calmness, which is of paramount importance if one would obtain the best results. I must confess that this seems to me to be a serious objection to such health resorts as are exclusively devoted to invalids and to those of the same disease; resorts, moveover, which are of narrow confines, like Davos, for instance. Is not the objection all the greater to sanitaria, where many invalids are under one roof, particularly if the disease is phthisis? It seems difficult, nevertheless, to obviate this. Naturally the physician desires to send his patient, and he to go, to the climate supposed to be best suited to his disease, and so, as a result, they collect at the few well-known localities. A wider and better personal knowledge of climates and a careful study of the individual patient can do something toward remedying this. The same or as favorable a climate as the one we think best adapted to our patient, and represented by a health resort centre, can often be found which has not yet been invaded by the army of invalids, and which,

at the same time, possesses favorable conditions enough in other respects, such as food, lodging, companionship, diversion, and the like, to answer to the demands required by our patient. In the great climatic range of Colorado it would be pretty easy to do this, it seems to me, or in the high pine belt of the South, though here the matter of good food and accommodations might be a difficult one. Again, a sea voyage might accomplish it. Certain it is that the influence of an environment of strong, healthy, and consequently cheerful, individuals about an invalid is more conducive to rapid improvement and hopeful anticipation, than one of invalids with the constant reminder of "Memento mori."

Lastly, the age of the patient as a psychological factor is important in considering the effect of the change to be made. "Hope," it is true, "springs eternal in the human breast," but it springs more exuberantly in the young human breast, and we can count more upon this universal element in human nature in the young than in the middle-aged and older. The adaptability of the young to changed and new conditions is great, and with them we can venture on more radical changes than with the older, who are bound by long association to friends and places. Not infrequently it may be a question whether, with our older patients, it is wise to take the risks of an abrupt and radical change. At all events, if it is decided upon, more care should be taken to surround the invalid with some semblance of his former environment, so that he may more readily take root in the soil to which he is transplanted. After all, to keep him within a shorter radius of home may seem the wiser thing, the greater contentment and hopefulness retained by so doing compensating for the loss incurred by being in the less favorable climate.

In conclusion, I hope that I have emphasized some points often too lightly passed over in the very serious consideration involved in settling the question of change of climate for our patients.

From my own experience and observation, it has seemed to me that these psychological factors, as I have called them, have not been given as careful consideration as their importance demands. Ours is a material and scientific age, and medicine feels the influence of the time and age; but there is a spiritual as well as a physical side to the human entity, and he is the wise physician who duly weighs in his considerations and decisions the influences of the spiritual side as well as that of the physical. "The doctor," says Wilks, "soon finds that in treating his patient the practice of medicine is not only one of physic, but of psychology, and that the effects of his drugs depends as much upon the constitution of the patient's mind as his body."

THE PATHOLOGY OF HEMOPTYSIS FROM CHRONIC PULMONARY DISEASE.

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For the convenience of discussion, we will assume that we are considering only cases of true pulmonary hemorrhage, wherein all extraneous sources of blood supply, such as aortic aneurism, cardiac rupture, etc. have been ruled out of the symptoms of the case. We can then roughly divide pulmonary hemorrhages into two groups: (*a*) cases which present physical signs of pulmonary disease, and (*b*) cases in which no physical signs of changes of lung structure can be found.

Our knowledge of the pathological causes of hemorrhage in the first group has been thoroughly digested and organized by Virchow, Thompson and others. We know that hemorrhages proper in this group come from deficiencies in the pulmonary system of vessels, while bronchial hemorrhage, or leakage from the arterial supply of the bronchial tubes, is slight in quantity and merely streaks the accompanying secretions of those tubes. No inference can be drawn from the color of the blood as to its source, because the oxygenation of the pulmonary blood is so rapid that it is expectorated red. Blood which has lain stagnant in the tubes over night may, of course, look dark. Traumatic injuries of the vessels, aneurism, and diapedesis are familiar causes of hemorrhage in tuberculosis. According to Virchow, however, the greater number of hemorrhages in phthisis come from ulceration of the vessels.

In the second group, we find no clinical evidence of changes in the pulmonary parenchyma. We may,

indeed, locate the presence of blood in the bronchial tubes, but this does not necessarily determine the seat of the leakage, because the blood is rapidly drawn off into by-ways and side-issues, quite remote from its point of departure. The presence of hemophilia, scurvy, and habits of excessive drinking would lead one to consider alterations in the composition of the blood itself as a possible cause of hemorrhage. Some evident point of departure for an embolus, the possibility of thrombosis, the previous inhalation of irritating fluids, are matters for deliberation in diagnosis.

Pulmonary congestion is not of itself alone a prolific cause of hemorrhage. Thus veritable hemorrhage is a rare complication of pneumonia, and yet that disease produces high grades of congestion. In whooping-cough and congestive bronchitis the amount of blood is rarely copious, and is the result of violent coughing. One writer has observed that hemorrhages are rare in acute maladies of the respiratory apparatus, and any pulmonary congestion which is not symptomatic of a cardiac affection is rarely accompanied by the expectoration of veritable blood.

This brings us to the consideration of the heart as a factor of pulmonary hemorrhage. Fernet says: "After tuberculosis, heart disease exerts the greatest influence in producing hemoptysis," and mitral troubles stand pre-eminent in the causative list. Here, also, the element of exertion comes in, upon which Thompson lays so great stress. He says:

"The influence of exertion in the etiology of blood-spitting has not received so much attention as it deserves from the importance and frequency of the event, for cases occur in which hemoptysis has followed some unusual exertion, in which no positive proof of pulmonary disease can be shown to exist. . . . Prolonged exertion in walking and running leads to excessive hyperæmia of the lungs, consequent upon the rapid emptying of the veins into the right side of the heart, and either the lungs give way under a condition of general congestion with extravasation of blood, or local apoplexies of a similar kind occur; or, on the other

hand, the heart may become overstrained, and give way in a condition of general dilatation."

The following case, under my own observation, will illustrate the pertinency of the above quotation:

Mr. A., thirty-seven years of age, had smoked to excess for many years, and also had a history of spitting blood about twelve years ago and also once or twice since then. On August 26, 1887, he attended a convivial dinner, and on the next afternoon he played lawn tennis very energetically. That evening he raised a considerable amount of blood, and again the next day. On August 29th, I examined him, and found a few coarse and medium râles in the left sub-scapular space, and a slight diminution in the volume of resonance over the same region. There were systolic murmurs in the aortic and mitral areas, and the heart apex was considerably outside the mammary line. The bleeding stopped in a couple of days, and the patient was advised to avoid all smoking and all active exertion.

My notes for January 29, 1888, report, "No râles or dulness in the left sub-scapular space. Heart more regular, and murmurs faint."

In February, 1888, after walking against a strong, cold head-wind, he had another hemorrhage, with return of physical signs in the left sub-scapular space. The signs faded out more slowly this time.

On March 13, 1889, I found no dulness and no râles. The patient is strong and well, and is heavier in flesh than ever before. About six weeks ago, however, he raised a few mouthfuls of blood on the day following a plunge into the cold-water tank of the Athletic Club. The temperature of the water was about 68° F.

Still another group of cases calls for our attention, wherein none of the above conditions can be established. The lung simply bleeds, and there is nothing else to show for it. Some of these cases eventuate in phthisis. Some do not, and the crying appeal is to know if such cases are tuberculous at the outset. I can find no decisive answer to this question, though both sides have been maintained with hot

fervor. The fact that all cases do not develop into phthisis is no argument, because all cases of tuberculosis do not advance to phthisis. The only solution of this problem lies in a critical microscopical search for bacilli in every fresh case of hemoptysis.

There is one suggestion regarding pulmonary hemorrhage which has been advanced by Virchow and others, but which has received less attention from clinicians than it deserves; I refer to the influence of the nerve centres. Virchow says: "If we cannot deny, therefore, the greater frequency of hemorrhage by certain weather conditions, especially by weather changes, yet it appears that here also a contributing cause (Wallungszustände) must be sought, which possibly lies in the nervous system."

We have already seen that pulmonary congestion, *per se*, is not sufficient for hemorrhage, inasmuch as pneumonia and other acute congestive processes of the lungs are distinguished by the rarity of hemorrhage. Moreover, Cohnheim has shown by his experiments upon embolism, that mere congestion is ineffective for bleeding in other organs. He induced an artificial embolism in the frog's tongue, by introducing small particles of wax into its circulation. The first effect was a severe congestion in the neighborhood of a vessel occluded by a bit of wax, but no hemorrhage occurred. Not until three or four days later was a hemorrhagic infarct formed; the blood cells then did not extravasate indifferently, but all of them passed through selected points and grouped about the same. These points were not otherwise distinguishable in their appearance. Hence, Cohnheim concluded that diapedesis is not due to the presence of a congestion, but to changes in the constitution and resistance of the vascular walls.

Admitting these facts, we ask if similar changes in the condition and resistance of the vascular walls can be wrought by any perversion of nerve influence alone, and we receive an immediate answer in the affirmative. I need only refer to a few illustrations.

We are all familiar with the ecchymosis which forms on the under lid of suicides when the bullet has pierced a certain part of the brain. Schiff has shown that lesions of the cerebral peduncles can determine ecchymosis in the mucous membrane of the stomach; Brown-Séquard has produced hemorrhages in the lungs by lesions of the pons; Strauss speaks of the ecchymoses tabetiques upon the extremities following severe pain; Faisans and Kellar describe sub cutaneous hemorrhages resulting from great moral commotion in neuropathic persons; vicarious menstrual hemorrhages are a common experience, and it is interesting in this connection to note that out of two hundred cases collected by Puech, hemoptysis figured twenty-four times—*i. e.*, in twelve and one-half per cent. Great weight is laid by Virchow upon a certain condition of the arteries themselves, which he called Wallung, or orgasm, and he evidently believes this Wallung to be under the direct control of the nerves. Affluxus of blood, he says, to the locality of an irritation, does not comprehend to-day the history of the blood Wallung. Of course, Wallung occurs upon irritation, but it is not always limited to the locality of the irritation. It may appear sympathetically at points greatly remote. Illustrations of this condition are observed in the pulsatio epigastrica of hypochondriacs; in the heat-flushes of women during the climacteric; in the pulsations of the head in cephalalgia; in the throbbing of a temporal artery with the toothache. Moreover, this sensation of Wallung is also felt in the chest and sometimes precedes a hemorrhage which removes the disagreeable sensation, according to the evidence of patients.

In conclusion, therefore, I would say that I believe that a more careful discrimination of our cases of pulmonary hemorrhage, would reveal some of purely neurotic origin.

THE CLIMATOLOGY OF HEMOPTYSIS IN CHRONIC LUNG DISEASE FROM AN ETIOLOGICAL AND THERAPEUTIC STANDPOINT.

By ROLAND G. CURTIN, M.D., Ph.D.,
OF PHILADELPHIA.

In glancing over the field we are confronted by so many and varied influences of climate at work both in causing and preventing hemoptysis that the subject will be best considered by taking up each factor separately and discussing it, as to its bearings on the symptom under consideration, and then tabulating the result.

If the chronic lung disease is removed by climate, this, a mere symptom, is necessarily ended. We must be careful in our study not to magnify hemoptysis, which is, as we have called it, a mere symptom, into the prominence of a distinct disease. The great practical point for us is to consider the subject in such a way that an insight may be gained as to the best prospect of relief afforded by climate for our patient who suffers from hemoptysis.

We have all felt the want of a definite knowledge for the decision of a climate proper for a patient suffering from hemoptysis. Hemorrhage resulting in the sudden death of a citizen, away from home and relatives, may cause reproaches to be showered, perhaps deservedly, upon the medical adviser who has reommended a change of climate. A definite knowledge of this subject may avert such a catastrophe.

In glancing over the field certain points are suggested to us. First, I will give a brief summary of the more important causes of bleeding from the lungs in chronic pulmonary disease. We are liable to hemorrhages from the lungs caused:

1. By capillary congestion of the bronchial mucous membrane.

2. By congestion of the parenchyma of the lung.

3. From erosion of bloodvessels from the ulcerative process.

4. Predisposition from alteration of the blood, as in hæmatophilia.

5. Atmospheric influences.

6. Nervous influences.

The hemorrhage may be bronchial, capillary, arterial, or venous.

I will briefly enumerate the principal factors under the head of *climate* as we shall study it. It includes all the influences exerted on the atmosphere by the geography, meteorology, geology, botany, and astronomy, whereby the human body is affected. The principal climatic conditions affecting hemoptysis are included under the following heads: heat, moisture, altitude, asepsis, rarefaction of air, etc., which will be separately considered, and in detail.

I will first take up the subject of *rarefied air*. It is usually a pure air, having no germs or malaria. An elevation of 16,000 feet takes off one-half of the air-pressure at the sea-level (fifteen pounds to the square inch). Any fraction of the above height has its corresponding effect on the surface pressure. The following experience of those connected with the Oroya Railroad, in South America, is given in *Bell's Climatology*, page 82:

"This withdrawal of pressure often occasions the most severe symptoms of vertigo, headache, nausea, and vomiting, all more or less alarming, and attended with profound prostration. The whole are attended with increased respiration and rapid action of the heart. Dr. Ward says some are affected with fearful nausea and vomiting, comparing it to the worst form of sea-sickness. Others suffer from severe frontal headache, palpitation of the heart, etc. From the violence of the heart's action it really seems at times as if it would burst the walls of the chest. Occasionally severe hemorrhage occurs from all the avenues of the body. The respirations are increased from three to five times a minute. Dr. Ward says he has counted forty-three respirations and 148 pulse in a minute at an elevation of only 9000 feet, and that the pulse is

always increased in frequency but not in volume. A person who at the sea-level has a pulse of 75 per minute, would find it increased about ten beats at an altitude of 10,000 feet, and would experience ten additional beats for each 1000 feet of added altitude. The rule is that no one passes for the first time an altitude of 16,000 feet whose pulse does not mount to from 130 to 150 beats in a minute."

When a person rises rapidly in a balloon to a great height, blood sometimes oozes from the mucous membrane, owing to the withdrawal of the usual atmospheric pressure, and the increased pressure in the bloodvessels from increased heart action. This is the so-called "balloonist's hemorrhage." To illustrate more fully the effect of being suddenly brought into rarefied air found at a great elevation, I quote from *Bell's Climatology*, page 80:

"A most singular illustration of its effects was given me by Dr. Heath, who is the surgeon employed on one of the Peruvian railroads now building from Packasmayo to the Andes. While making this trip over the road with him, he informed me that the visible effects of this existing cause were quite common in his experience. He mentioned an incident he witnessed far up on the line of this road. He experienced one day as he approached a party of workmen on the road a severe and sudden pain in his side, causing him to 'double up.' He, however, managed to walk on, and one of the workmen hailed him to stop and see several men who were ill, and had been taken that instant with severe pains, etc. What was still more wonderful in his statement of coincidences, but which has since been vouched for by the others, was that at the same moment he felt this pain he saw two birds which were flying overhead fall to the ground and were picked up dead. The ordinary effects of *rarefied air* are a paralysis of the cutaneous nerves, and redness of the skin from dilatation of the capillaries. This effect on man might, if exerted upon a bird, produce sufficient shock to cause death."

If the bloodvessels and tissues within the lungs are weakened by degenerative changes, or if the bloodvessels are weakened by the ulcerative process, trouble might ensue from the decreased air pressure *without*, especially as the increased action from the heart *within* would assist in producing a hemorrhage.

To show you that simple rarefaction of the air may

produce hemorrhage in chronic lung disease, I will cite a case which bears upon this point. A patient with a history of chronic cough and dyspnœa for three years, upon examination of the chest, gave indication by the physical signs of consolidation and some softening. He had never had hemoptysis. At the Hospital of the University of Pennsylvania we had an apparatus for the purpose of treating patients with rarefied air. After breathing a few inspirations of rarefied air for the first time, an alarming hemorrhage took place, which continued for half an hour. No hemorrhage ever followed this.

Dr. Theodore Williams, in the *Lancet* of May 12, 1888, in his data of the analysis of 141 cases of phthisis treated at an altitude varying from 5000 to 9000 feet, concludes that the climate is useful in cases of hemorrhagic phthisis, and that hemoptysis is of rare occurrence at the mountain stations. In the discussion of the paper of Dr. Williams, it was stated that the effect of altitude was to lower arterial tension, and that this might explain the freedom from hemoptysis. When hemoptysis did occur, it was owing generally to too sudden arrival at great heights. The hemorrhage was then of the order known as "balloonist's." Under any circumstances it will be safer to elevate your patient slowly. Where the ascent is by the conveyance of rapid trains, you can direct him to stop at stations on the road, so as to prevent the danger occasioned by a sudden arrival at a great altitude.

If the effect of elevation is to cause a lowering of arterial tension, as stated by some authorities, this gradual elevation of the patient will allow this factor to come into play, thus saving him from the danger of balloonist's hemorrhage.

Rarefied air is almost always associated with a dry and pure condition.

Sea air or *tide-water air* is a condensed air, and opposed to a rarefied condition of air in its action on the human frame, for here we have the full pressure of fifteen pounds to the square inch. Asso-

ciated with the pressure, there is at the seaside a condition which is very unfavorable to tubercular patients. Besides the increased air-pressure without, and the increased arterial tension within, we have a slowed heart. Sea air is almost always moist, and this, with the irritation of salt always in the air, hastens the ulcerative process, and counterbalances the good effect of the denser air.

In syphilitic phthisis the denser air and the increased arterial pressure are, I believe, beneficial in a curative way, as shown in my paper read before this Society two years ago in Baltimore. Seaside air, like sea air, is more moist than inland air; even more so than that at mid-ocean; but it is more variable as to temperature than out at sea or an island at the same latitude. The blood pressure is less from the slowing of the heart's action, and the denser air gives support to the bloodvessels, and the weakened tissues and weakened bloodvessels. These two conditions increase the danger of hemorrhage.

Another favorable condition experienced by a patient first arriving at the seashore is a result of a calming influence generally exerted over the nervous system, by which the patient will sleep longer and better for several nights. This quiet condition would in itself tend to prevent a hemorrhage, but, again, the ulcerative process is also generally hastened, tending later on to more danger. The air of fresh-water lowlands is apt to be dangerous to a patient from the miasmatic influences which are often present as well as from the increased moisture.

Cold air. What is the effect of a low temperature upon the body? The tissues and bloodvessels contract, especially the capillaries, driving the blood from the periphery toward the centre, not, however, with sufficient force to cause a dangerous internal congestion. Cold tones up the tissues in contact with the air, bracing them for their work. It has a beneficial effect upon the appetite, and favors assimilation, strengthens the nervous system, imparting internal vigor, while the lungs are also able to resist

the increased blood-pressure within the arteries, owing to the strengthening effect of the reparative action of lowered temperature.

Warm air. The effect of continued warm air is to cause a debilitated and relaxed condition of the tissues and bloodvessels, which would in itself rather tend to the exudation of blood from the diseased tissue of the lungs. The influence of the relaxed state of the system at large, would have a tendency to diminish the force of the heart, thereby slowing the circulation, and consequently decreasing the danger of hemorrhage.

Dry air desiccates the pulmonary tissues, hence less moisture not only favors the return to health of the tissues affected by chronic disease, thus preventing the flow of sanguineous fluid, but it has also the immediate effect of preventing the oozing of blood from the surface of the altered lung tissue. Dry air is usually aseptic and the messenger of health.

Moist air influences the tendency to hemoptysis by causing a moist condition of the tissues, macerating and liquefying them, and it thus unblocks the bloodvessels, dilutes the blood, and makes it more fluid, all of which may cause the walls of the vessels to weaken, as well as a tendency to the breaking-down process in the lungs, causing a greater danger of hemorrhage. Moist air is usually the bearer of effluvia and miasma, which are detrimental to the health of the patient.

The air of an elevated region is usually an *aseptic air.* It purifies the blood, thus bracing up the system, favoring the healing process. This air is an anti-bacillary atmosphere, hence the healing process is assisted by the destruction of germs in the diseased lungs. An atmosphere of this kind is usually cold and dry, and aids in the arrest of decomposition. These factors all assist in causing an improved condition of the diseased tissue, which is the most favorable solution of the patient's case.

Home sickness (nostalgia) is one of the compli cations which sometimes attend a change of resi-

dence. It has a very depressing effect upon the mind and body, which may prove to be disastrous in a case with a tendency to pulmonary hemorrhage. To show the effect of depressing emotion on a case of hemoptysis, I will cite three cases that came under my observation.

Nervous influence may sometimes affect hemorrhages independent of other causes.

To illustrate the influence of the nervous system in producing hemoptysis as well as other hemorrhages I will first cite the case of a woman having a small phthisical area at the right apex, as shown by bronchial breathing, impaired resonance, progressive emaciation, and a slight cough, who was one day shocked by seeing a wagon draw up in front of her house. Supposing that it contained the body of her husband, she was immediately seized with a profuse hemorrhage, and died in a few moments. The corpse which had occasioned her alarm had been by mistake drawn up to the wrong door. It proved to be the body of a man who resided in the next house. In the autopsy it was seen that the lungs were merely indurated, the breaking-down process had not commenced.

To illustrate further the influence of the mind upon hemorrhage, I will cite the following case:

A child about twelve years of age, a patient of Dr. Ogden's, was suffering from typhoid fever, with profuse hemorrhages from the lungs, stomach, fauces, nose, mouth, bladder, and bowels. The amount of blood lost was sufficient, if it continued, to kill the patient in a few hours. We gave an unfavorable prognosis to the mother of the child. She went with tears in her eyes into the room where the child was lying. The child in a whisper said: "Did the doctor say I was going to die? Don't cry, mother, and I will get well." The blood in a short time began to flow less freely, and in about eight hours it stopped entirely.

The grief of the mother was a shock to the nervous system of the child, which, in my judgment, saved its life.

Here we have in one case an illustration of hemoptysis being caused by emotion, while, in the other two, of its being stopped by the same cause.

A woman with chronic phthisis was seized in the morning with a profuse hemorrhage from the lungs. In the latter part of the afternoon she was taken upstairs to her room, and a fire was kindled in a stove in which her son had previously concealed a quantity of gunpowder. An explosion ensued, destroying the stove. The greatest solicitude after the explosion was for the patient. But it was found that the bleeding had been summarily arrested by the shock of the explosion.

Homesickness will nullify the effect of any climate.

There are certain influences at work when a change of residence is made that are not enumerated in the foregoing list, which I think belong to climate, and as they may work to the advantage or disadvantage of a patient with a condition inclining to hemoptysis, I think them worthy of detail.

An out-door life is generally a life of exercise. The pure air favors repair, by improving the general condition, and is often a strong factor in a change of residence. Vigor is imparted to the system in general.

An in-door life is usually a life of quietude in a vitiated atmosphere which leads to a further degeneration of the diseased tissue, and is a cause of weakness. A feebleness of the system at large is engendered by such a life.

Sunshine. A patient living in a crowded city, shaded between walls, and with, perhaps, many cloudy days, is subjected to depressing influences. On removing a person so situated to a region with much sunshine, and to an out-door life, he will be benefited and greatly exhilarated by such a change. With such a change he will, of course, have a drier and purer air, which must tend to have a beneficial influence on the local condition. The general improvement incident to a change of residence is due to all the foregoing factors. All tend to strengthen

the weakened tissues, and favor a cure of the existing cause.

Atmospheric influences. Aside from the usual climatic influences before enumerated, certain conditions seem to favor hemoptysis. I have noticed both in my private and hospital practice, several cases of hemoptysis developing on the same day. In two hospitals I have had from two to five cases develop, on the same day, under my care—a number greater than during the whole of the rest of the year —and these attacks lasting, perhaps, two or three days. They occurred in winter, in mild weather, and with a moist atmosphere. No epidemic of pneumonia or influenza followed this atmospheric disposition to hemoptysis. Phthisical cases are generally the sufferers at these times. No disturbances in the temperature of the patient follow these attacks. I have known three years to pass without any such hemorrhagic epidemic, and have observed two in one year, about two months apart. I recall five epidemics of this kind. And now, if I have two or three cases in my private practice, I ask the resident physician of the hospital, upon arriving there, how many cases he has. The answer is, "I have one, two, or three cases." What is the cause of the foregoing tendency? It seems to be atmospherical, but the specific cause I cannot give. I merely call attention to this observation that others may arrive at a true solution.

Having considered the factors and climate that influence hemoptysis, I will tabulate them under two heads.

First, the preventative and curative, and second, the causative.

PREVENTATIVE AND CURATIVE ELEMENTS.

Rarefied air tends to prevent hemoptysis by arresting the ulcerative or other diseased processes, and also by lowering the arterial tension. This climatic condition probably greatly overbalances the unfavorable tendency of the increased heart action, and

loss of support to the lungs from diminished air pressure.

Cold air contracts the tissues and bloodvessels, thus preventing a flow of blood when a tendency to hemoptysis exists. It is beneficial by its general invigorating effects to the system at large.

Dry air robs the diseased structure of its moisture, decreases the fluidity of the blood, and blocks up the bloodvessels, all favoring the arrest and prevention of bleeding.

Aseptic air. The purity of this variety of air favors repair and cure of the lung disease, and kills or dwarfs the action of the disease germ.

Out-door life, when not associated with too much exposure, exertion, or fatigue, is beneficial.

Sunshine is beneficial, inasmuch as it improves the general nutrition.

CAUSATIVE ELEMENTS.

Sea-level air, by its greater density, diminishes the tendency to hemoptysis, but the increased arterial tension, and the moisture which are usually present in such a locality more than counterbalance the beneficial effect of the support given by the air pressure.

Salt air has a bad effect on tubercular lung disease by hastening the breaking-down process. The effect is probably good in syphilitic lung troubles, and sometimes in simple chronic inflammatory lung affections (not tuberculous).

Moist air has a very deleterious effect, by hastening the ulcerative process, as well as by liquefying the blood and secretions, and macerating the diseased surface in the lungs, thus rendering the tendency to the oozing and flowing of blood more liable.

Warm air relaxes the tissues and bloodvessels and enervates and relaxes the system at large.

From the foregoing arguments we should conclude that each case should be carefully studied, in all its phases, before deciding upon a change of residence. On a high mountain (say from 5000 to 10,000 feet),

a residence far removed from the seacoast, is best for a patient with a tendency to hemoptysis. At a location of this kind one would probably have not only a rarefied, but also a cold, dry, aseptic air, factors which would be most beneficial. Care should be taken that the elevation of the patient should be gradual and not too rapid, otherwise the early effects of a sudden elevation might be followed by unpleasant results. A case of syphilitic phthisis will probably be benefited by sea air, while a tubercular patient would in all probability be injured by such a residence.

TREATMENT OTHER THAN CLIMATIC OF HEMOPTYSIS IN CHRONIC PULMONARY DISEASE.

By JAMES B. WALKER, M.D., Ph.D.,
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In considering the treatment of a symptom of even so grave a seeming as hemoptysis, the prognostic significance thereof is of much import. Is the occurrence of hemoptysis a grave indication? This query at once opens for consideration the various pathological conditions resulting in hemorrhage, and the response to it must be correspondingly varied. I take it for granted that we are united in considering hemorrhage from the lungs at times absolutely harmless and even remedial; and at others so serious as to demand the utmost efforts of the physician in its arrest; and even at times, though happily rarely, so excessive as to produce a fatal issue before aid can be summoned.

Hemoptysis, early in phthisis, is, in the vast majority of cases, slight, and, unless long continued, calls for no medicinal interference. Hygienic measures usually suffice. These consist in placing the patient in a cool room, with light and loose covering, only sufficient to avoid a feeling of chilliness. His head and shoulders should be slightly elevated, except where syncope is threatened. During and immediately after the hemorrhage, rest of body should be enforced, the completeness of this rest being commensurate with the gravity of the hemorrhage or the dangers of a recurrence. It may necessitate as nearly absolute immobility of the entire body as is possible to obtain; the interdiction of speech; the use of the bed-pan and urinal for the ejecta, and the spoon or feeding-cup for the ingesta;

and the muscles of attendants for all needful changes of position.

All mental and emotional excitement is to be subdued. The most important of these is fear, and, considering the gravity encircling in the popular mind, even a slight loss of blood from the lungs, it is not surprising that this should be. This is usually quieted easily by a calm and reassuring deportment of the physician, and is, of course, intensely accentuated by the slightest evidence of alarm or even anxiety from him. The bleeding organ should be especially placed at rest, and, in addition to the avoidance of speech, unnecessary coughing should be checked, usually requiring opiates in all cases of irritative cough, or where there is more than the slight effort necessary to remove the exuding blood.

The diet should be bland and digestible, small in quantity and, of course, nutritious. It should be given cool or cold. Milk, or, where acids are frequently repeated in the medication, the whey thereof, cold meat, teas, and ice. Water should be given sparingly, except where the hemorrhage is excessive, when it may be required more abundantly. So long ago as 1792, Davidson reported in the *Medical Facts and Observations*, published in London, two cases of hemoptysis cured (?) by total abstinence from liquids. Stimulants are to be avoided.

Attention to the various emunctories is important, especially the bowels, and slight saline laxatives are beneficial in even the mildest cases.

In many cases nothing further will be needed. In the graver forms, or in even slight attacks of patients naturally weak or debilitated by disease, more or even most decided efforts may be demanded, in addition to the purely hygienic. As nature is usually equal to the emergency, aided, unaided, or even when slightly hindered, a vast number of specifics have been vaunted. And it is equally true that as at times she is powerless, more efficient aids have been searched for.

Measures which relieve the local engorgement

deserve, perhaps, first consideration. Dry or moist heat or counter-irritants to the extremities; aconite or veratrum viride; free saline purgation; iced compresses or ice-bag, limited to the area overlying the bleeding point where discernible, and kept in place but a little while at a time but frequently repeated; heat to the spine; venesection—of, however, questionable utility in any case of hemoptysis now under discussion, viz., in chronic pulmonary disease; Dr. Müller's substitute for venesection, an elastic bandage around one extremity, allowing it to remain for six or eight minutes, and applying another to the other extremity before loosening the first, which latter must be done slowly, a method contraindicated where the pulse is weak and blood poor in quality; dry cupping in the interscapular or infra-clavicular regions; the popular remedy, a spoonful of salt, whose efficacy, according to Skoda, is due to the gastric or gastro-intestinal irritation induced, are some of the measures by which relief to the area of engorgement is attempted.

The induction of measures to occlude the bleeding orifice by aiding the occurrence of the clot, and by diminishing the orifice to be occluded, call for measures classed as hemostatic, most of which aid directly or indirectly both objects. The astringents are thought by most to be efficacious hemostatics, and are used by most practitioners either internally or topically in spray or vapor.

For internal use gallic acid or acetate of lead is employed. If gallic acid is chosen, it should be given in ten-grain doses every two, three, or four hours. If acetate of lead is used, it may be given in pill with opium extract, unless the latter is contra-indicated, or, as the Drs. Williams recommend, in five-grain doses in a solution containing an excess of acetic acid every two, three, or four hours, with a magnesium sulphate draught every morning to avoid the gastro-intestinal effects of the remedy. The mineral acids, and especially the sulphuric, are held in high esteem by many on account of the

combined astringent, refrigerant, and roborant effects. Sulphuric acid may be used with other astringents or hemostatic factors and add not a little to their efficiency. A class of remedies similar in the results obtained, and, according to many close observers, more efficacious, is the essential oils, especially of turpentine and erigeron. These may be robbed of their one objectionable feature, their disagreeableness, by administration in doses of five or ten drops in capsule or closed French pearl or globule, or the closed soft capsule of Parke, Davis & Co.; the ordinary bivalve capsule is not admissible. Excreted in part by the pulmonary mucous membrane, the terebinthinates are more certain to come in contact with the bleeding point or points, and, both rationally and by observation of many, they are more likely to arrest the hemorrhage, albeit their manner of doing so is not satisfactorily demonstrated, than are the astringents which depend for their local effect on the solution in the great volume of blood serum. Terebene may be substituted for the turpentine.

For topical application, alum is most vaunted; next to this a solution of iron perchloride and gallic acid; but, while these are usually chosen because they can be sprayed cold, I have seen the vapor of turpentine apparently promptly effective in a severe hemorrhage when these and other astringents had failed. It is stated that some of our North American Indians smoke Canada balsam mixed with their tobacco in cases of hemoptysis with apparent efficacy. Eucalyptus, matico, hamamelis, and a number of other astringent substances are used and, no doubt, useful; but it would seem desirable in most instances to depend on definite solutions of the active properties themselves than on more or less indefinite compounds, natural or artificial, containing them.

But of all the aids to nature in closing bleeding orifices, where aid is absolutely in demand, ergot must be given preference. This may be given by the mouth, but if prompt action is needed, should

be administered hypodermatically, and repeated as often as the urgency of the case demands. If given by the mouth, it may be made more efficient by combining sulphuric acid, dilute or aromatic, repeated every four hours. Digitalis is frequently effective, and in weak hearts with lowered vascular tone it is strongly indicated. Its good effect is probably due chiefly to the contraction of the arterioles induced by it.

There are other plans of treatment which should, perhaps, be at least mentioned. The use of ipecac, so highly praised by Graves and Trousseau, administered to induce nausea, or even vomiting, is scarcely needed and is of doubtful advisability in the class of cases we are considering, especially when so many apparently less objectionable measures are at our disposal. Dr. Neale, in *The Medical Digest*, refers to the method in use by the Chinese and Malays in cases of hemoptysis. It consists in the administration of a half pint of the urine of a child. While this may be efficacious, it is not likely to be extensively adopted by civilized communities even as a household remedy.

If fever result, indicating local inflammation, active counter-irritation by blister or less violent agency; with quinine internally and the use of astringent or terebinthinate or antiseptic inhalations, should be resorted to. Rest should be enjoined in these cases until the fever subsides. But in the majority of cases enforced rest must be short-lived and cease with its necessity. After the hemorrhage has been securely arrested this measure should cease, and the disease which has occasioned it must be combated by improved nutrition, which will demand a certain and, of course, a varying amount of bodily activity and a more liberal dietary.

Preparations of larch bark have been used and may be substituted for turpentine, which they resemble in composition and effect. Hamamelis has proven effective, according to Brunton, in cases where ergot and digitalis have failed, while in others it has failed

and they have succeeded. It may be given by inhalation or internally.

The treatment of hemoptysis during the attack is, however, not so important as during the intervals. Every case of hemoptysis, at whatever time occurring, from the incipiency to the stage of cavities, is of serious moment. As already stated, it is rarely of gravity in itself, but it is of gravity as indicating a pathological condition which makes a hemorrhage possible. As aneurisms are rare, save from direct violence to the artery, except where there exist defective vessels, so complete rupture and hemorrhage, as in hemoptysis, are perhaps always due to a diseased vessel. Notwithstanding the fact that the pulmonary capillaries have less extraneous support and are structurally most liable to rupture of any vessels in the entire vascular apparatus; yet, in the intensest engorgements to which as healthy vessels they are exposed in the first stage of acute croupous pneumonia. how rarely do we have a true hemorrhage Believing that hemorrhage in incipient phthisis is due, in the vast majority of cases, to vascular deterioration from bacillary invasion, we should take our suggestions in the treatment of such from this fact—if such it be—and place our patients under more favorable hygienic or dietetic conditions than they have previously enjoyed, else there is little hope for a permanent improvement or for the prevention of repetitions of the hemoptysis. To change of climate I may add change of occupation or habits, which will render the already diseased lung less vulnerable to bacillary invasion.

I recall for illustration a very marked and interesting case which occurred under my observation some years ago.

The patient was a man of about eighteen years who had about as extensive an inheritance of vulnerability as can be imagined. His uncles and aunts, of whom there were several, had all but one died of phthisis, and this one has since died of it after dragging along a semi-existence for some years.

Both parents had died of phthisis. I cannot recall the history of the previous generation.

Frank was a tall, slender and frail boy, and was employed in the counting-house of one of the largest dry goods stores in Philadelphia. This counting-house, with glass sashes surrounding it, some of which were always closed, stood back in the store and was lighted with several gas-jets the whole day through. In this deoxygenated den he had spent his working days for some months, when one day, about fifteen years ago, in the spring of the year, without warning, he had a hemorrhage of the lungs. The right apex was slightly infiltrated, and under rest the hemorrhage ceased after a few days. Under directions he quit his occupation, went to light work in the vineyard of an uncle who lived on a hillside bordering on one of the lakes in central New York. Returned in the autumn greatly invigorated, without objective or subjective sign of pulmonary disease, and by living an out-door life has never had a recurrence.

This is but one instance of many in the experience of, perhaps, all of us, where vulnerability has been changed to invulnerability by improvement of the environment.

To summarize the treatment I would say: Hygienic measures are adequate for the arrest of most cases of hemoptysis occurring early in chronic pulmonary disease. They constitute much the most important part in the treatment of even grave cases. In ordinary cases, in addition thereto, sufficient doses of an opiate to quiet unnecessary cough will be all that is required.

For the severer attacks, or where their repetition gives even a slight hemorrhage a gravity it would not otherwise possess, we should administer either the peculiar hemostatics, turpentine, erigeron, tincture laricis, or others of this class; or astringents, preferably gallic acid or acetate of lead, and these preferably by the stomach.

If topical applications are resorted to, they should be such as admit of perfect solution in the atomized fluids, as alum; or in the air inhaled, as turpentine,

and forced efforts at inspiration with the idea of carrying into the lungs a large quantity of medicated air to mingle with the complemental and residual volumes are to be guarded against, lest the very effort to increase their efficiency shall increase the hemorrhage.

Where the hemorrhage is serious from its excess or persistence, ergot should be freely administered, by the stomach, if possible; hypodermatically if rapidity of action is imperative.

But in most, if not in all cases, hemoptysis should be considered due to bacillary invasion, and efforts to lessen the vulnerability of the patient should be resorted to and followed persistently.

DISCUSSION.

Dr. F. I. Knight, of Boston: First, in regard to what struck me in Dr. Curtin's paper—that he recommended elevated regions for hemoptysis. I presume it would be fair to infer from what has been said that a patient would be more liable to hemorrhage in high altitudes than in low. There is one remedy which Dr. Walker has not emphasized in regard to patients with hemoptysis. That is, the use of opium. I must say I think it is the great gun, and I should be very sorry to be without it in these cases.

Dr. P. H. Kretzschmar, of New York: I wish to say in regard to the treatment of hemoptysis, that as far as Dr. Walker has touched it he has not placed the most stress upon the most important remedies. The most important remedy, in my opinion, is perfect rest. The Doctor admits it is one of the modes of treatment, but thinks it should be shortened. The second he mentions, but only in a passing way, and that is the ice-bag. He speaks of the ice bag and says it should be placed over the affected part. It seems sometimes rather difficult to decide where the affected part is, and if you want to decide where the blood comes from, you would have to make possibly a careful physical examination, and I think one of the greatest dangers would be in making percus-

sion over a lung that has just ceased to bleed. Therefore, it being rather difficult to say exactly where the blood comes from, it is better, in my opinion, to put the ice-bag over the heart, and have the effect upon the heart. As to the third point, I wish to be recorded as agreeing with Dr. Knight in saying that opium has not been given a proper place by Dr. Walker. It has not been given the place it has a right to demand, because morphine or opium, together with the ice-bag, are to my mind the most important factors.

Dr. J. C. Wilson, of Philadelphia: I think a distinction should be made in considering the subject of pulmonary hemorrhage between those cases of hemoptysis which occur generally and those which occur in patients who have previously shown no symptoms. Those cases generally require complete rest and one or two moderate doses of opium.

Dr. A. Loomis, of New York: I have a single word to say. Some time last winter a young man who was apparently perfectly well was seized with a profuse bleeding. I saw him after his first hemorrhage and his second hemorrhage was just beginning. I took some of his expectoration to the laboratory and examined it and found it swarming with tubercle bacilli. He went on for a week or so, the bacilli being present in every specimen examined. Then his hemorrhage ceased, and after the second week no bacilli were found in his expectorations. It seemed to me that the bacilli in the bronchial tubes were the cause of the hemorrhage. They did not get deep enough to stay, or did not stay. I shall watch him with a good deal of interest. That is the only case in which I have been able to examine the bleeding at the time. If it shall be found that this is a frequent condition, it seems to me we can explain the cases of hemoptysis better than we have been able to explain them before.

Dr. Walker: I fully agree with all Dr. Knight has said, and perhaps did not give so much stress to opium as it should have had. Still it is on its influence in establishing rest to the affected part that its virtues as a hæmostatic depend. It seems to me that I have made rest the prominent feature of the treatment of the disease. I made it the most important factor. I think that the criticism that rest was not given sufficient place in the paper will not probably be found to be justified in

reading it. As to the ice-bag, I did not suppose it was necessary to multiply words in the discussion of that. It is not particularly difficult to find where an affected part is; it is generally a simple thing, and it is not necessary to percuss the chest to locate it sufficiently. The ice-bag to the apex of the affected side is in my opinion sufficiently accurate for practical purposes.

REMARKS ON THE TREATMENT OF PULMONARY PHTHISIS.

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Until the present decade, no theory adequate to explain the facts in regard to the origin and nature of the tuberculous diseases, and especially of pulmonary phthisis, had been advanced. One hypothesis after another had been advocated only to be abandoned, leaving a heritage of erroneous views and misleading phrases to encumber the general stock of information. Pathologists, in their eagerness to cope with the most grievous scourge of modern civilized life, generalized upon insufficient data. The progress of knowledge in regard to this group of diseases was, therefore, slow and halting. It consisted chiefly in the accumulation of facts, among which there can be found neither coherence nor relation. Many of these facts, collected with untold toil, are to-day without significance or value, except to overthrow the views for the support of which they were gathered. When all was said, it seemed as though the progress from the time of Laennec to 1882 was scarcely worth mentioning. To-day it appears to many of us to have been no progress at all.

Koch's discovery of the tubercle bacillus, and his demonstration of its causal relation to the tuberculous diseases, mark an epoch in medical history. Since that time scientific research has taken the place of ingenious surmise, and the evolution of a theory constantly supported by new and interdependent facts has gradually illuminated the darkness that overspread the subject of tuberculosis. It is true

that there are yet obscure corners and unsolved problems. The present is a period of transition. But the confusion of the present has this advantage over the chaos of the past: there is a hopeful prospect that out of it will evolve order.

Let us regard pulmonary consumption in all its forms as a type of the tuberculous diseases.

This much may be safely predicated:

Pulmonary consumption is an infectious disease, due to the implantation and development of the tubercle bacillus in the lungs of a susceptible individual.

It is of advantage to present this proposition in its simplest form. It follows that the tuberculous diseases of other organs are infections, likewise due to the access and development of the tubercle bacillus. The pathogenic unity of the tuberculous diseases and the primary localization of the process are obvious deductions. The overflow of local collections of tubercle bacilli, or of matters laden with them, by way of continuous surfaces or perforating lesions, explains the extension or the generalization of the process; thus, for example, from one lobule to another, or to another lobe, or to the opposite lung, or to the larynx, or upon deglutition to the intestine, or, again, by the erosion of the capsule of a lymphatic gland, to a bronchus, or into a vein, with the production of acute general tuberculosis. But acute general tuberculosis is a rapidly fatal disease, presenting strong points of resemblance to the specific fevers, especially to enteric fever. Let us confine our attention to the local lung disease. If it be local, how are we to account for the constitutional symptoms?

The results of recent researches in the field of the chemistry of the infections render it in the highest degree probable that many of the general symptoms of these diseases are not directly, but only indirectly, due to the bacteria which constitute the infecting principle. Toxic substances—ptomaines—are continuously evolved during the period of the development

of the pathogenic bacteria in the organism. These principles, being soluble in the circulating blood, occasion constitutional phenomena analogous to those caused by certain alkaloidal poisons. Several of these substances have been isolated.

The grave constitutional symptoms which are sometimes associated with circumscribed lesions, the general improvement frequently observed during periods of quiescence on the part of the local process, the disappearance of symptoms in cases where the local process becomes obsolescent, the prolonged fair health which is occasionally seen in individuals with extensive but distinctly encapsuled cavities, all lend support to the view that in pulmonary consumption likewise, not the bacillus itself, but ptomaines which it produces, are the cause of the malnutrition, asthenia, fever, sweating, and other general symptoms of the active disease. That these ptomaines are among the products of the disintegration of tissue elements from which the bacteria derive pabulum is obvious. To arrest such tissue-disintegration would mean, on the one hand, to prevent the formation of ptomaines; on the other, to deprive the parasite of the pabulum necessary to its growth.

The destruction of pathogenic bacteria outside the body, or the prevention of their access, constitutes prophylaxis. Where measures of this kind are efficient, the question of individual susceptibility or predisposition becomes of minor importance. When such measures are inadequate, the prophylaxis must include efforts to render the individual insusceptible, efforts which have been fully realized by vaccination in smallpox.

In broad, general terms, disinfection includes two processes, which, however, are not in all instances distinctly separated, but which often overlap. These are,

1. The destruction of germs.
2. The sterilization of organic substances.

The first is a germicide process; the second, an

antiseptic process. Measures of disinfection employed in the sick-room and in the treatment of the excreta of the sick are germicide. Here the object is the destruction of bacteria. The processes by which meats are preserved, as by smoking, salting, and the like, and the means taken to preserve pathological specimens and cadavera for anatomical use, are antiseptic. Here the purpose is, not to act directly upon the bacteria which may produce destructive changes, but to act upon substances liable to those changes in such a manner as to render them infertile for the growth of the bacteria.

Efforts have been made to utilize both these methods in the curative treatment of disease. In theory one or the other or both of them are available in the treatment of tuberculosis, a local infection gradually extending by the implication and destruction of new areas of tissue, the elements of which are necessary to the growth and development of the bacillus. Superficial tuberculosis is, under certain circumstances, amenable to germicide treatment in the simplest form. Thus the enucleation of superficial tuberculous lymphatic glands and the effectual scraping and disinfection of the surrounding tissues, now constitute an accepted and efficient treatment. The medical history of the last seven years teems with the records of unsuccessful efforts to utilize various germicide methods in the treatment of pulmonary consumption. The apparent early successes of several of these methods are to be explained, partly by the enthusiasm of those who have advocated them from the beginning, and partly by the fact that consumptive patients, especially when congregated together in hospitals, are liable to present misleading evidences of improvement for a short time after the employment of methods of treatment at once novel and having a specious appearance of being scientific. Their failure is due to the fact that the tubercle bacillus is more resistant to germicide substances than the tissues which constitute its natural habitat.

Even in the case of exposed tuberculous ulcers or

of pulmonary cavities so situated as to be accessible to germicide drugs, either by inhalation or by direct injection through the chest wall, the bacilli in the surface discharges, or in the accessible curdy necrotic material collected upon the cavity walls, are no longer active in causing the tuberculous process. They are simply admixed with material ready to be thrown off, and are dangerous only in so far as they are liable, by transposition to unaffected tissues, to light up new local processes. The bacilli which are active are deeply imbedded in tissues inaccessible to any germicide which does not, at the same time, involve in destruction the parasite and the structures which constitute its host.

One germicide method only, and that the latest, has not yet been shown to be unsuccessful. It is the method of Weigert, and consists in the prolonged inhalation of superheated air. Whether or not the tissues of the human lung can preserve their integrity, when exposed to air of a temperature ranging from 212° F. to 480° F. sufficiently long to destroy the tubercle bacilli imbedded in them, remains to be demonstrated.

In the antiseptic plan we have a method of treatment likewise based upon the pathogenic *rôle* of the bacilli. This plan has for its object not to destroy the bacillus directly, but to augment the powers of resistance of the structures which it assails. If the tissue elements can be made to withstand the disintegrating action of the parasite, then the chemical changes by which are elaborated, on the one hand, the nutritive material needed for its growth, and, on the other, the poisons which cause the general symptoms of the disease, would be prevented. To this plan must be referred those methods of treatment which have been generally recognized as beneficial, including measures of hygiene, dietetics, with hyper-alimentation and the administration of fats, pulmonary gymnastics, and climate, the object held constantly in view being such an improvement in the general condition of the patient as to retard or

bring wholly to an end the destructive processes in the lungs.

Among medicines, the utility of which has been long and generally recognized, are the preparations of iodine; the preparations of mercury; arsenic; the phenols, especially carbolic acid and creasote.

The members of this group have one striking peculiarity in common, namely, that they are powerful antiseptics. With the exception of the phenols, they belong to the group of medicines known as alteratives; and the question suggests itself, in this connection, as to whether or not their so-called alterative influence is not, to some extent at least, due to an influence which, in long-continued moderate doses, they exert upon the tissue elements of the body in such a way as to increase the powers of resistance of the latter to disintegrating morbific agencies.

Clinical researches in this direction are not without promise. Alteratives of this kind have hitherto been employed simply upon very vague opinions regarding their general influence upon nutrition. If they can be shown to exert a special influence upon nutrition antagonistic to the action of pathogenic bacteria, not only will their usefulness be much increased, but clinical problems relating to the mode of administration, dosage, and effects, will at once engage the attention of practical therapeutists.

The existing methods of treatment are unsatisfactory. Germicide methods have proved utterly futile. The suggestion of an antisepsis that will increase the powers of resistance in the living tissues opens up a field worthy of systematic cultivation. Two things are especially needed: first, the earliest possible recognition of the local lesions of pulmonary consumption; second, the earliest possible employment of the combined means which have shown themselves in the hands, not of one, but of many practitioners to be useful. These are improved hygiene, dietetics, climate, respiratory gymnastics, and the use of alteratives.

The universal experience of those engaged in making large numbers of post-mortem examinations shows a frequency of obsolescent tuberculous lesions in the lungs, such as warrants a large degree of hope in the energetic treatment of the disease in the stage of primary infection. The conventional disregard of the earliest symptoms, both on the part of patients and physicians, is unfortunate. Far better for the doctor to tell the patient his worst fears at once, and institute the treatment at a time when the evidences of tuberculous infection are still doubtful, than to temporize until large areas of pulmonary tissue are implicated, and the growing parasite has become a fruitful source of new infection, both within and outside of the body of the patient.

SOME OBSERVATIONS ON THE CAUSATION AND TREATMENT OF ASTHMA.

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Few diseases have occasioned warmer discussions than asthma, on account of the obscurity which prevails in regard to its nature. By some it is regarded as a pure neurosis, capable of being excited in all sorts of ways, and often by the most trivial circumstance or change. For others there is scarcely such an affection as *nervous asthma alone* and independent of evident pathological changes in the chest or in other regions of the body. From either point of view the essential part of the disease is the disturbed innervation of the bronchi, which is accompanied by paroxysmal dyspnœa. The spasmodic nature of the disease was admitted by Laennec and Andral in its early periods, because they were unable to discover in the chest sufficient lesions to account for the attacks of difficult breathing. Later the precise seat and character of the spasm of the bronchi were determined by Dr. C. B. J. Williams, by means of the artificial excitation to which the nerves of the bronchial tubes were submitted.

The anatomical and physiological facts in support of the spasmodic theory of asthma are: 1. The fact that muscular fibres are found throughout the extent of the bronchial divisions, even to the infundibula or air-sacs. 2. That these muscular fibres can be contracted to the point of closure under different kinds of stimuli.

Clinically it is supported by the facts: 1. That an attack of asthma may begin suddenly in an indi-

vidual without evidences of any chest affection. 2. On account of the variety of the pathological lesions which precede or accompany it. 3. Because the pathological conditions are often mere sequelæ of long-continued asthma. 4. Because sometimes asthmatic attacks disappear although the chest lesion remains, and because no one of these lesions is always adequate to explain the asthmatic paroxysm. 5. The character of the asthmatic attacks resembles very much different nervous affections, like neuralgia or migraine; although many pathological conditions may tend to produce it, yet it is a disease apart, affecting the nervous system. 6. The great value of the administration, by the stomach, of the nitrites in the relief of asthma, as shown by Dr. Thomas R. Frazer, of Edinburgh, in his admirable clinical study of its cause.[1]

As opposed to the spasmodic theory, it is stated that the culmination after a paroxysm of asthma is marked by a profuse sero-mucous exudation accompanied by cough and expectoration (Bosworth). It is thought, therefore, that this theory should be abandoned. In its place, it is contended that the theory of Webber should be admitted. This theory is based upon the idea that the asthmatic paroxysm is not due to spasm, but to a paralysis of the vasomotor nerves which regulate the calibre of the blood-vessels in the bronchial mucous membrane. Under the influence of this paralysis the membrane becomes suddenly swollen, and thus encroaches upon the calibre of the tubes and accounts for the dyspnœa in inspiration and in expiration, through reduction of the calibre of the air-passages and insufficient movement of air in their interior. It must be recognized, however, that the dyspnœa in asthma is also caused by insufficient contact of air with the blood-vessels in the pulmonary vesicles. This occurs when the air vesicles are filled with liquid or semi-liquid

[1] The American Journal of the Medical Sciences, October, 1887.

contents, as may and does occur in asthma brought on by preceding bronchitis.

My object, however, in this paper is not to debate theories of the asthmatic attack, but simply to make known a few clinical observations of interest in regard to its causation and treatment. During the past winter, while on duty at St. Luke's Hospital, several patients came under my care for the consequences of malarial infection. Amongst them four gave histories from which it was evident that asthmatic attacks accompanied frequently an outbreak of the poisoning. In these instances, also, the curative influence of anti-malarial treatment upon asthma, subsequent to the unsuccessful trial of ordinary medication for bronchial inflammation, was undoubted. I shall narrate the cases in brief terms:

Case I.—W. L., forty-four, married, Englishman, house-painter, now residing on Long Island, entered St. Luke's Hospital, October 22, 1888. Intermittent fever at fifteen years of age; again at thirty-two years. Four weeks previous to admission to hospital patient had a chill followed by fever and sweating. These attacks occurred daily for two weeks, and afterward every other day. Patient is troubled with cough and wheezing whenever he has an attack similar to the one described. Patient has had a cough for the last three weeks, accompanied by irritation and tickling in the chest. About the time of the initial chills, patient has some difficulty of breathing and obstruction in the nasal passages. This lasted one week. Examination of lungs negative; spleen enlarged. Patient had chills and fever in the hospital. Microscopic examination of blood, on intermediate day of chill, revealed hæmatozoon malariæ. Patient relieved of chills, fever, bronchial and asthmatic manifestations by the use of quinine. Discharged cured, November 13, 1888.

Case II.—L. L., forty-two, single, Englishman, boat-maker, was admitted to hospital October 3, 1888. Has had frequent chills and fever since last August. Contracted malaria in Costa Rica. Chills are usually quotidian. Patient had a chill followed by fever shortly after coming into the hospital.

Examination of lungs negative, except a few bronchial râles. Patient "accuses dryness in throat and pain on swallowing, especially acids." A few days later, patient stated he was less choked up in his breathing and coughed less than on admission, but throat not less dry, particularly in the larynx. Nose somewhat obstructed by deviation of septum toward the left nasal passage anteriorly. In median portion of the nasal passage septum deviates to the right. In this region there is, also, more marked thickening of the pituitary membrane. Pharynx pale, thickened, œdematous looking, no mucus. In nasopharynx no mucus, pale, œdematous. Patient says cough is only occasional; spleen is enlarged.

October 8. No dryness, and absence of all symptoms in upper or lower air passages, which were present on admission. This result had been obviously obtained by the use internally of Warburg's extract. Discharged cured, November 30, 1888.

Case III.—A. J., male, thirty-four, missionary, admitted November 27, 1888. "Cough and constricted feeling in chest," obviously due to intermittent fever contracted on West Coast of Africa. On examination, lungs negative. Discharged improved, December 3, 1888. Re-entered, January 6, 1889 (been well about three weeks). Last fourteen days "had cough and pain in chest." A few days previous to admission to hospital had chills followed by sweating—chill recurred the day before he came into hospital. Examination of chest showed "good resonance, a few moist râles, sibilant and sonorous râles." Treatment was anti-malarial.

Case IV.—J. G. P., thirty-six, married, clerk, admitted to St. Luke's, October 11, 1888. Has had tertian type of malaria for ten years. Several nights ago chills and fever began again; since that time repeated chills, followed, or not, by fever and accompanied by "difficult breathing and morning cough *without* much expectoration." Examination of lungs shows "hyper-resonant percussion note, sibilant and creaking râles, moist râles on cough." Patient dates his difficulty of breathing back to his first attack of chills and fever, but can trace no connection between the two. Patient was ordered to take Warburg's extract.

It seems to me that these cases show a very evident causative influence of malarial poisoning in pro-

ducing bronchial irritation and asthma. In two of the cases ordinary expectorant mixtures were first employed without the slightest beneficial result following. The patients were treated with quinine, or Warburg's extract, and immediately improved.

In the case with partial nasal occlusion the anti-malarial treatment was equally efficacious, thus demonstrating that the nasal organ was not responsible for the asthma. In the different articles on asthma that I have read, I have found little or nothing said of malaria as an efficient cause. Humoral asthma is, of course, spoken of, and allusion is made to morbid conditions of the blood circulating through the system, and especially the nervous centres. Duclos, Bouillaud, and Trousseau were of this opinion, but thought that the morbid changes in the blood were the same that gave rise to gout, rheumatism, and hemorrhoids, and only caused spasm of the bronchi when the "peccant" matter was eliminated by this channel.[1]

In treatises or articles on malaria I find cursory allusions made to the influence of the miasm on the bronchial tract. Thus Liebermeister speaks of "a bronchial catarrh sometimes preceding the paroxysm, and manifesting an exacerbation at the moment of the outbreak."[2] Loomis[3] says, you may have a form of chronic malarial infection showing "itself in catarrhal inflammations affecting the mucous membrane of the stomach, intestines, and bronchial tubes. Patients have a form of bronchitis which is really a chronic malarial infection."

An analogous explanation to that offered by Dr. D. E. Keefe, in the *Boston Med. and Surg. Journ.*, of May 16th of the present year, to interpret the production of irregular œdema complicating malaria is probably equally good for my reported cases, *i. e.*,

"the poison of the disease acts on the nerve-centres, and through the sympathetic ganglia paralyzes the vaso-

[1] Berkart: On Asthma, p. 41.
[2] The Infectious Diseases, p. 35. Detroit, Michigan.
[3] Lectures on Fevers, p. 175.

motor nerves, thereby dilating the bronchial arterioles, and thus causes an afflux of blood to this part."

And Dr. Keefe goes on to say what is really a translation of Webber's theory of asthma:

"This superabundance of blood the veins of the part find it more than usually difficult to return to the circulatory centre, in consequence of the congestion existing, ... and pressure on and narrowing of the lumen of the veins and lymphatics. In this manner stasis is undoubtedly produced, and may often be followed by transudation." This opinion, however, conflicts with Bosworth's affirmation,[1] for this author distinctly states that this condition "differs from inflammation in that there is no tendency whatever to the escape of leucocytes."

There is another form of so-called humoral asthma which is not infrequently met with. The cases to which I refer are those forms of faulty secondary digestion in which this condition seems to account for the incitement of the paroxysms. In these cases the asthma is not occasioned directly by the presence of the food in the stomach, but later, when the veins have probably taken up the materials elaborated by the digestive process—and which in the asthmatic seem to stimulate unduly the hypersensitive pulmonary plexus. The blood, particularly in the gouty subject, seems to become readily charged with imperfectly changed and effete substances. This is an effect of deficient metabolism. It seems probable, in these cases, that not only the peripheral pulmonary nervous system, but also the central portion of it, is irritated unduly by the matters referred to. I have seen two such cases during the past winter:

Case V.—The first was that of an old lady, a widow, who suffered extremely at times from chronic rheumatic gout. When one or the other of her joints was most affected, she had no asthmatic seizure. When the pain left her joints, and she could hobble around with comparative comfort and freedom, she was apt to have a regular asthmatic seizure during the night. Lately the pains in the joints have

[1] Trans. of Amer. Climat. Association, September, 1888, p. 179.

improved, there is no asthma, but she has suffered from marked trigeminal neuralgia. Relief was found in the use of lithia water, saline cathartics, and iodide of potassium with occasional small doses of colchicum.

Case VI. was that of a distinguished New York lawyer, about fifty years of age, a bachelor, who has been a gouty subject for a number of years. This patient returned from Europe only last autumn, after a cure at Homburg. He had been very abstemious in his diet, had taken a fair amount of exercise, and considered himself in very good trim. One afternoon, in walking up town, he was suddenly attacked with dyspnœa which lasted over half an hour, or until some time after he reached his own home. During several successive afternoons the difficulty of breathing recurred at about the same hour and disappeared spontaneously, but perhaps somewhat more slowly. He then consulted me. Upon examination of the chest, I found nothing to account for it.

With very little reason for treatment in anything I discovered, I gave him some anti-dyspeptic combination of drugs. This medication proved wholly useless. I examined his urine with a negative result. Patient was finally given colchicine and a saline aperient each morning. A few days later the dyspnœa had disappeared and patient felt entirely well. At this stage, however, the urine showed a heavy deposit of urates and a large amount of uric acid.

It is evident in this case that the *materies morbi*, instead of acting on the joints, or on the skin, produced an irritation of the nerves of respiration and thus caused dyspnœa. It might have caused, as I have occasionally seen it do, coryza, or more extensive congestion of the upper air tract. Here we should recognize in the asthmatic development merely the symptom of a constitutional disease, which may manifest itself in a variety of ways. Gout and asthma are certainly, at times, both results of a common cause. As yet I am not aware that there is any recorded case in which the characteristic deposit of urate of soda has been found in the lungs, but if it were so, it is probable that it would produce

an effect in some sense similar to what it does in the joints.

I may very properly approximate with the preceding those more frequent cases of true peptic asthma in which the gastric filaments of the pneumogastric nerve are irritated immediately by the ingesta, and this irritation is propagated reflexly to the pulmonary filaments and produces through them bronchial contractions (Salter). I have met with more than one such instance during the past winter. The following case is an illustration:

Case VII.—C. A. B., forty-three, single, waiter, was admitted to St. Luke's Hospital, November 21, 1888. Intermittent fever six years previously. Latterly has suffered a great deal from asthmatic attacks. *No nasal obstruction.* "Shortness of breath and cough, especially in the morning, is all patient complains of." Sibilant and sonorous râles in chest, tongue heavily coated with thick fur. Prescribed mixture rhei et soda, and in a few days gastritis was cured and asthma had nearly disappeared.

Case VIII.—J. P., forty-five years, clerk, came to New York Hospital on November 5, 1888. Complains of having asthma during past seven years. Has constriction of the chest most of the time, but is decidedly worse at night than during the day. Excessive beer-drinking seems to occasion asthma, and yet the condition of the stomach does not give the patient any concern. Asthma is also aggravated by cold and damp weather. Patient never consulted a physician, but usually has been taken care of by a druggist. Both nasal passages free, and feels well except for asthma. Asthmatic attacks as severe as formerly. Physical examination reveals in front and posteriorly over chest, sibilant and sonorous râles everywhere, heart normal, considerable area of dulness to left of vertebral column. This patient was advised to stop beer-drinking and given a carminative. His asthma improved. He was also ordered a blister of cantharides to be placed between the shoulders posteriorly over the dull area, 3½ in. by 4 in. This blister also proved to be very useful in alleviating the dyspnœic attack.

I am of opinion that this case was one of *peptic* and *bronchitic* asthma combined. No doubt the engorged peritracheal glands accounted for the area of dulness and were slightly diminished in size by the application of the blister—thus taking off pressure from the pneumogastric nerve trunk.

A case of the latter kind is the following:

Case IX.—H. D., thirteen years old, schoolboy, who came to the New York Hospital on October 8, 1888. He had been ill three months—suffering from cough, expectoration, dyspnœa, which became orthopnœa at night. When first seen a blister was applied between the shoulders. The blister did not raise the skin very much and was only of slight benefit.

Boy stated on October 18th that he had suffered from asthma since he was two years of age. He had been two years in New York; before he was in Ireland. When he was three months old he had a rash all over the body and on the head. He was told it was eczema. It lasted seven years. His asthma has improved somewhat since he came to the United States. Has taken cod-liver oil, quinine, Irish moss, etc., without much benefit, although at one time he suffered from chills and fever. During one month past his breathing at night has been very bad. *No nasal obstruction.* Cough and dyspnœa occur about 4 A. M., and last several hours. Damp and cold weather aggravate his condition.

Physical examination shows emphysema on both sides anteriorly. Sibilant and sonorous râles everywhere anteriorly, and in different regions posteriorly. On percussion a very considerable area of dulness is found to the right of the vertebral column, extending from the spine of the scapula to lower angle of it. Ordered fly blister, to be repeated several times at suitable intervals.

Oct. 26th.—Boy returned. Is feeling very well. Cough ceased immediately after application of the blister. Breathes perfectly. He was never relieved by any medicine as much as by the blister. Previously and subsequently this boy was given iodide of potassium, which also relieved him somewhat, but the blister had the most marked effect for good.

Lad continued well until December 22, 1888, when he had a recurrence of pain in chest, cough, and great oppression. He believes he caught cold, which precipitated his attack. Same treatment advised as previously.

This case, in my judgment, is one of those in which the asthma seems due to direct irritation of the pneumogastric nerve by enlarged bronchial glands. In these cases the iodides are of unquestionable benefit, and may be given advantageously not only during, but between, the dyspnœic attacks. Unfortunately, their use does not ward off their recurrence invariably, nor, indeed, always mitigate greatly their severity. Whenever there is much complicating chronic bronchitis, it is in these instances that I have most satisfaction from their use. If any plausible theory can be given of their utility, it would seem to be mainly in their power of promoting the reabsorption "of cellular exudates into inflamed tissues."[1]

Williams[2] favors the use of the iodide of potassium, and believes its beneficial action consists in the reduction of the enlarged glands through the influence of the iodine. The indications for prescribing this remedy are, according to him, (1) the absence of catarrh, (2) the well-marked presence of the neurotic element, (3) the detection of dulness along the right or left edge of the first portion of the sternum, or in both interscapular regions, showing enlargement of the bronchial glands. He combines arsenic at times with iodide of potassium with great advantage to the patient. The great value of iodide of potassium in the treatment of asthma has been confirmed within a few years by Lazarus and Lublinski,[3] the latter regarding it as a specific in this affection.

In several cases of extreme dyspnœa in which the lungs were apparently normal, and yet the patient could not support the recumbent posture, Andral

[1] Journ. of Amer. Med. Assoc., May 25, 1889, p. 729.
[2] Amer. Journ. Med. Sciences, August, 1888.
[3] Berl. klin. Wochenschr., 1887.

has found enlarged bronchial glands pressing upon the pneumogastric and pleuric nerves. He therefore affirms that such a condition may be a frequent, if not a constant, cause of asthma. The observation is probably correct, although, according to Berkart, the inference is not so, since we sometimes find the pneumogastric nerves imbedded in large bronchial glands, and yet no dyspnœa has been produced.[1] We know, however, that enlargement of these glands is no infrequent accompaniment of affections of the lungs, either at their surface or deeper in their structure. In many cases this enlargement follows upon the catarrhal pneumonia of whooping-cough and measles, and[2] diminishes or increases according to the amount of, or obstacles to, the lymphatic current. Other changes than mere hypertrophy of these glands will doubtless depend greatly upon the constitutional tendencies of the individual. Although the enlargement of the bronchial glands diminishes with the subsidence of the inflammatory process which occasioned it, it seldom disappears entirely. It is especially in scrofulous patients where we find the greatest tendency to enlargement of these glands, and the slightest irritation may become an efficient cause of it. Cruveilhier[3] has found these enlarged glands repeatedly deep in the structure of apparently healthy lungs. The bronchi are often flattened by them. Now, then, if an inflammatory process of the air-tubes takes place, the latter may become greatly obstructed. This glandular enlargement was formerly supposed only to explain the intermittent dyspnœa of childhood. It is now known that it frequently occurs in adult life, and will thus account for many cases of asthma which otherwise are very obscure in their origin.[4]

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[1] Loc. cit., p. 21.

[2] N. Gueneau de Mussy, "Etudes Cliniques sur la Coqueluche." L'Union Méd., Nos. 81 and 85.

[3] Traité d'Anatomie pathologique, t. iv., 1862, p. 640.

[4] N. Gueneau de Mussy, "Adenopathie Bronchique." Clinique Médicale, t. i , Paris, 1874, p. 569, et seq.

De l'Adenopathie Trachéo-bronchique. By A. Baréty. Paris, 1874.

With respect to children, Baréty[1] says that every time a child is attacked with dyspnœa resembling an asthmatic attack, we should not neglect to examine it carefully, and see if we can discover this form of adenopathy. Rilliet and Barthez, indeed, declare never to have observed nervous asthma in children. In all cases where they have observed continuous or intermittent dyspnœa they have found changes in the lungs, bronchi, or in the bronchial secretions.

The enlargement of the bronchial glands can rarely be discovered by percussion over the sternum, or between the scapula. But inasmuch as they serve to impede the entrance of air into the lungs, there is generally complete absence of respiratory sounds after cough as well as after manual compression of the chest. These symptoms are usually observed only on one side of the chest, whilst on the other side the different catarrhal rhonchi can be distinctly heard. Glandular enlargement in the neck, or in the supra-clavicular region on the side where the chest obstruction exists, are of great diagnostic importance.[2] The seeming integrity, however, of the thoracic organs is no sufficient reason why the cause of the asthma may not be found in the presence of glandular enlargement around the trachea or bronchi. This supposition is strengthened by the existence of bronchitis or emphysema.

For Rilliet and Barthez, the disease which offers the greatest resemblance with ganglionary asthma is intermittent, sibilant bronchitis. In the latter case, however, the sibilant râles are more acute and general, and in the interval between the attacks the general health is unaffected, and shows none of the signs of a grave or permanent alteration. Finally, the disease begins and ends like bronchitis.

Hyde Salter appears, also, to regard the swelling of the bronchial glands as a very frequent accompaniment of the bronchial inflammation to which eighty per cent. of all cases of asthma are traceable. Pres-

[1] Loc. cit., p. 231.

[2] Berkart, loc. cit., p. 202.

sure on the vagi and their branches may result from this condition. To their effect on such glands is probably due the wonderful efficacy of iodides in asthma (*Amer. Journ. Med. Sci.*, 1888, vol. xcvi. p. 129).

In all cases of asthma of adult life it is important to examine the urine and see that it is healthy and free from albumin, so that we may not unwittingly have to do with an asthmatic attack which is merely a uræmic manifestation. In these cases, usually, œdema of the lungs is present. Of course, in view of our lately acquired knowledge, the larynx, and especially the nose, must be examined, to see that they are free from disease or from obstructive conditions.

I may now properly consider briefly my own experience of the importance of the nasal factor in the etiology of asthma. Since last autumn I have seen and treated about thirty cases of asthma due to different causes. Amongst these there were six in whom the asthma might be fairly ascribed to the existence of intra-nasal obstruction. Of these six cases, five were due to hypertrophy of the turbinated bodies in conjunction with more or less deviation and thickening of the nasal septum. The sixth case was one of mucous polyp. In all six cases operations on the nasal passages were undertaken. The nose was rendered pervious, and the patients experienced much comfort as a result of the operations. As regards the effect on the asthma, it was noted that in four cases the asthma was at least temporarily improved. In two cases there was no marked relief.

As will be noted in the histories previously reported in this paper, there were many cases in which asthma existed, and yet at no time was there any appreciable nasal obstruction. Further, I have seen a large number of cases, several of which I have operated upon successfully, in which there was pronounced nasal occlusion, and at no time had there been the slightest tendency to asthma. These facts, I regret to say, are not wholly in accordance with

the statement of Dr. Bosworth, who, it will be remembered, presented a most interesting record of his experience at the meeting of this Association in Washington, last September. According to Bosworth :

"The existence of nasal disease was found to be present in every case in sufficient degree to warrant the conclusion that it exercised a powerful causative influence in the production of the asthmatic attacks."

The proof that this view is correct is shown, he says :

"in the fact that, of eighty cases, forty-six were cured, twenty-six were improved, three unimproved, and five unknown, and this entirely as the result of treatment of the nasal disorder. The inference," Dr. Bosworth adds, "can safely be drawn that, if the attack of asthma is cured by curing the nasal disorder, the asthma was caused by the nasal disorder." [1]

Dr. Shurly, I think, answered Dr. Bosworth's statement very successfully when he said that

"daily experience overwhelmingly shows a very large number of cases of intra-nasal disease in persons of neurotic habit, with a very small proportion of cases of associated asthma."

"We are going much too far," says Dr. A. H. Smith,[2] "when we seek to establish it as a rule that asthma is to be cured by operative procedures within the nose." As Dr. Daly affirms, it is unquestionably true "that there is a certain proportion of cases of asthma that can be cured by putting the naso-pharynx in a healthful condition."

And it is also true that some *cases of asthma* can be cured solely through the instrumentality of the cautery, the saw, the rongeur forceps, or the nasal trephine. As a case illustrative, however, of the negative effects of the latter treatment, I would report the following :

Case X.—P. C., laborer, sixty-one years old. During the past four years, or more, has suffered from cough, expectoration, dyspnœa, lumbar and chest pains. Patient cannot sleep in recumbent posture and has a paroxysmal attack each morning

[1] Trans. Amer. Climat. Assoc., September, 1888, p. 181.
[2] Loc. cit., p. 192.

of cough and wheezing. On account of physicians' statements he attributes most of his symptoms to his nasal deformity—which was unsuccessfully operated on, the first time, two months ago, by a prominent specialist of New York, by means of the nasal saw; a portion of the septum was removed at that time. Some weeks later a second operation was performed on the same nasal passage with Jarvis' rongeur forceps. Since these operations patient can breathe more freely through the nose; still the asthmatic attacks are unimproved and patient is a great sufferer. On examination of the nasal passages, I find atrophic rhinitis, but very slight obstruction on either side. In questioning patient closely I find a distinct history of constitutional syphilis. I could not determine in this case what physical condition produced the asthmatic attacks, but was at least confident that the intra-nasal condition had little or nothing to do with it. Anti-syphilitic and symptomatic treatment were tried with little good result. Patient disappeared after two weeks' treatment.

Still it is true that the condition of the nasal passages demands a considerable share of attention in the judicious management of asthma. It is also obvious that the permeability of the nasal passages is essential in order that the function of respiration may be carried on properly, and that the respiratory surface may be protected, and especially against the evil effects of constant or intermittent mouth-breathing. In the latter case the lungs do not receive a proper supply of air, and this fact may be corroborated by listening to the chest of one who alternately breathes through the mouth and the nose. Moreover, the nose is a filtering apparatus, besides providing the proper amount of moisture to the inspired current of air, and if it be interfered with, the foreign bodies floating in the atmosphere, instead of being arrested on its lubricated vibrissæ, penetrate directly into the lungs and cause, necessarily, irritation and distress. Therefore, whenever an operation is required to render the nose permeable, and particularly to when there is a tendency to, or confirmed, asthma, it should not, if possible, be delayed or neglected.

Frequently, however, the nasal occlusion is due to a congestion of the pituitary membrane, which in these cases may be greatly diminished or wholly relieved by the medicinal agents which are employed for the purpose of restoring the freedom of the pulmonary circulation. Again, crusts, scabs, mucus, accumulate in the nasal passages at times, and promote an inflammatory process which can be temporarily relieved by a suitably formulated spray. I have known the hyper-sensitiveness of the pituitary membrane to be greatly diminished at times by repeated applications of carbolic acid with glycerine and vaseline. Indeed, in this way, I remember two cases of asthma of nasal origin, in which I effected a temporary cure.

To show the differences of opinion in regard to the intra-nasal treatment of asthma, and particularly by cauterization, I would add, that in the discussion following the reading of Lazarus' paper on this disease, at the Berlin Medical Society, "the general consensus of medical opinion seemed to be that the number of cases in which asthma was benefited by cauterizing the nasal mucous membrane on the turbinated bones, was extremely small."[1]

In summing up this subject I will quote, with some modifications, from a paper written by myself and read in 1886 before the New York Academy of Medicine.[2]

There are, without doubt, a great number and variety of affections, mainly neuroses, under the direct influence of morbid intra-nasal conditions; still, at the present time we should be careful not to exaggerate their importance, and whenever and wherever we find a neurosis of the respiratory organs immediately reach the conclusion that the nose occasions it. There is much truth in the observations of the past few years in regard to the predominating influence of a hyper-sensitive nose, but there

[1] Annual of the Universal Med Sc., 1888.

[2] Respiratory Neuroses of Nasal Origin, N. Y. Med. Rec., p. 119, 1886.

is also a tendency to exaggeration in this regard, and we should be careful to exclude other efficient causes of *asthma* before admitting the nasal origin and instituting severe or prolonged treatment of this organ with a view to cure the *possible* secondary affection. The nose is naturally a sensitive organ, and many times I have produced epiphora, cough, spasmodic closure of the glottis moderate in amount, and slight dyspnœa, by the mere passage of instruments, or simple nasal examinations, when the result of my investigation was to show that no nasal trouble of importance existed. This is no new observation and I am conscious that all are familiar with it.

In reading the histories of clinical cases, we shall be disposed to take a one-sided view unless we secure the sobering influence which comes from extensive reading and larger experience. The only way, I believe, in which we can avoid error at present in this seductive question, is to search carefully for other cause, or causes, of asthma, and when none are discovered, then, and then only, we should admit the nasal origin of the neurosis, and institute treatment in accordance with this conviction. I agree entirely with Lublinski, who says: "If there is really a nasal affection, it should be treated according to its character, and not on any far-fetched theory of its etiological importance" (*Med. Rec.*, May 27, 1887). This being my opinion, I must reluctantly separate myself from any such radical position as that upheld by my eminent colleague, Dr. F. H. Bosworth, of New York, who writes that he has seen no case in which intra-nasal disease was not found as a predisposing cause of asthma. And again, to quote him textually, he has "never known a case of asthma to occur in other than an obstructive lesion of the nose or upper air-passages."[1]

Another form of asthma, which, to me, is rare and interesting, was recently seen by me at my office.

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[1] Amer. Journ. Med. Sciences, Sept., 1888, p. 256.

The history is as follows:

Case XI.—J. K., forty-nine years old, married, Swiss, laboring man, has always suffered from pains in the head and oppression on chest. Patient has noticed when pain in the head disappears his feeling of oppression in the chest becomes worse. This oppression is accompanied with occasional dry cough. The suffering from the oppression is most severe during the night. During the day, as a rule, he does not suffer much. Patient is awakened frequently during the night with attacks of difficult breathing. He is often constipated, and has nausea and vomiting, but the cephalalgia is the symptom which is most distressing.

Physical examination shows a large head with prominent, square forehead. Such a conformation of the cranium existed as we find in children suffering from moderate hydrocephalus with rickets. Patient remarked that he was said to have had a remarkably large head when a boy, and he remembers distinctly having had for many years as a youth profuse cranial sweating. His legs are moderately straight, but the general appearance of the man is delicate and slight. The lungs show probable fibroid induration, yet patient states that he has not coughed during the past winter. Often he awakes with difficulty of breathing at night when he has no cough at all. Dulness over right interscapular region.

Diagnosis was: Old rickets, with probable hydrocephalus leading to cerebral irritation, which condition is the cause of asthmatic attacks in a patient made additionally susceptible by the existence of a fibroid lung. The gastric catarrh and paresis of the lower bowel appeared to me of the nature of concomitant symptoms of the preceding conditions. Patient is coughing somewhat to-day, without expectoration. He is suffering from his head, and has notable difficulty of breathing. Upon close questioning anew, again patient insists that since childhood he has always found that his head pain originated the asthmatic seizures, although when the head became decidedly better the asthmatic attack grew rapidly more *intense and distressing*. Whilst the patient was in my office I administered a considerable dose of bromo-caffeine, and within fifteen minutes after taking it his pain in head, difficulty in

breathing, and cough were all almost entirely relieved. I ordered him to continue bromo-caffeine at proper intervals during twenty-four hours. Next day patient returned to my office and said he was decidedly better in every way—head less painful, no difficulty of breathing, and scarcely any cough. Thinking the patient needed building up, and that his bowels required attention, I ordered syr. hypophosph. comp. and a vegetable cathartic pill.

This case approximates somewhat, I believe, those described by Paulet[1] as epileptic asthma,

"who believes this form merits the name of epileptic neurosis of the gastro-pulmonary filaments of the vagus nerve. It is characterized by varying paroxysms succeeded by health. In many instances these attacks are preceded by *pain in the head* comparable to an epileptic aura. They come on during the day, and vomiting is a frequent symptom. It is a peculiarity of the affection that it is not improved by the routine treatment of asthma, but is successfully combated by that of epilepsy."[2]

This guides to a new line of treatment which has marvellous efficacy—*i.e.*, the use according to Paulet of large doses of bromide of potash combined with picrotoxine and soda.

This author states that the paroxysms were almost entirely suppressed at one stroke; but a single attack occurred at the end of ten days. Certainly my isolated case bears out the possibility of such a result.

In conclusion, I would say that I have not alluded to those very frequent cases of asthma—in fact, we may call them the usual ones—which are dependent upon old bronchial catarrh, accompanied by emphysema and more or less chronic changes in the cellular structure of the lungs. I have abstained from this because my paper is already unduly long, and because this interesting topic may be reserved for ulterior consideration.

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[1] Journal de Médecine de Paris, Feb. 19, 1888.

[2] Annual of the Universal Med. Sc., vol. i., A. 79, 1889.

DISCUSSION.

Dr. F. H. Bosworth, of New York: It seems to me Dr. Robinson alludes to bronchitis. Dr. Knight alludes to cases of asthma in which there are some other factors as producing causes. It seems to me he had better eliminate those cases. I agree with Dr. Knight that asthma is a symptom, but it is a symptom which occurs so largely that we are justified in calling it a disease. Certainly we treat it as a disease in itself. Something has been said in regard to cases of asthma which depend upon a disturbed condition of the stomach. I do not believe there is any logical connection between the two.

Dr. S. H. Chapman, of New Haven: This is a very fascinating subject to us all. In the cases which have been mentioned as those of asthma one thing has not been mentioned, and that is, the presence of sugar in the water. I have had during the past three months a case under my care that has been very instructive, in which I found sugar upon examining the urine. I learned to know exactly when my patient was having an attack of asthma.

Dr. Robinson: I would simply like to make one more remark. I would try to express such respect as I can for the researches of Dr. Bosworth in this direction, but I believe them to be erroneous from the point of view of general observation. From the point of view of special observation I believe them to be correct.

THE CLIMATIC TREATMENT OF BRONCHIAL ASTHMA.

By FREDERICK I. KNIGHT, M.D.,
OF BOSTON.

If one seeks information on the selection of a suitable climate for an asthmatic patient, he will soon realize that no successful attempt has been made to establish indications for preference of one climate over another for any given case of asthma; that changes of climate have been made usually in an experimental way, and have been as likely to be attended with aggravation as relief to the symptom.

The chief cause of this is the mistake which has been made in trying to reduce all cases of asthma to one class, assuming that the ultimate cause and mode of development of this symptom were the same in all cases. This has led to the origin and promulgation of different theories, which have been in turn supported and abandoned. We find, in looking over the literature of the subject, that at one time asthma has been considered almost exclusively as a bronchial spasm of local origin, and treatment appropriate to this condition recommended; at another time, the theory of hyperæmia of local origin has received much favor; and at still another, the reflex origin (at one time of spasm, and at another of hyperæmia) has been dwelt upon.

This habit of the human mind, of looking at only a part of the truth, was characteristically urged by Dr. Daly in his paper at the last meeting of this Association. This is especially true of the medical mind, and the inevitable result of specialism in practice has been to increase this tendency.

The ease of error of the medical man is greater than that of the blind men in Tolstoi's fable, be-

cause, while he may soon learn to interrogate all parts of the animal brought to him for examination, he will also soon be made aware that there is a great variety of animals. The specialist is familiar with one kind of asthma, according to his field of practice. The asthmatics who go to a rhinologist are naturally those who have trouble in the nose; the asthmatics whose symptoms are wholly thoracic consult some one of repute in that field; and this leads to the result that Dr. Bosworth[1] tells us, that he has found evidence of intra-nasal disease in every case of eighty asthmatics on his note-books, in sufficient degree to warrant the conclusion that it exercised a powerful causative influence in the production of the asthmatic attacks.

It has also led Dr. Hyde Salter[2] to say that eighty per cent. of cases of asthma in the young date from some acute inflammatory affection of the lungs, and has led Berkart to put the proportion due to this cause as high as ninety per cent.[3]

The dermatologist would tell us, perhaps, that he had seen asthma almost invariably associated with eczema, and the syphilogian might say that he had never seen a case of asthma without syphilis. The fact is, that asthma is only a symptom, and the factors whose combination produces a paroxysm are not always the same.

I should agree to the combination given by Dr. Bosworth as applying to a large class of cases, including most of the hay-fever cases. This combination was: 1. The neurotic habit. 2. A diseased condition of the nasal mucous membrane. 3. Some peculiar atmospheric condition, which precipitates the paroxysm;—*i.e.*, we have a predisposing, a determining, and an exciting cause. In order, however, to make this applicable to asthma in general, I should consider it necessary to make the second

[1] American Journal of the Medical Sciences, Sept. 1888.

[2] On Asthma; its Pathology and Treatment. New York, 1882, p. 78.

[3] On Asthma; its Pathology and Treatment. London, 1878.

and third conditions more comprehensive. The second might be stated as a morbid condition somewhere in the respiratory tract, it may be in the upper air-passages or in the lungs themselves, whose irritation shows itself by a reflex exhibition in the bronchial tubes. The third condition should be made to include not only peculiar atmospheric states, but also digestive derangement, mental disturbances, and other remote irritations which act by reflex on the bronchial tubes.

It should always be borne in mind also that we may have more than one of the conditions mentioned under the second and third classes operative at once. For instance, we may have nasal disease and some change in the lung structure coöperating in the same patient, and also more than one of the exciting causes operative at the same time. This should lead us to be guarded in prognosis, and not to be too confident of cure because we have detected a single factor which is capable of removal. Who has not seen asthma persist after removal of nasal polypi, or after removal of a patient from a pollen-laden air which seemed to be the exciting cause of the attack?

In regard to the coëxistence of different factors for the production of bronchial asthma it may probably be said that only the second and third are absolutely necessary, and that while the first (the neurotic habit) is a pretty constant factor, a paroxysm may be produced without it when the determining cause (second factor) is situated in the lung itself. In considering the effect of climate upon the paroxysm it can readily be seen that its effect upon each of the factors should be studied separately; and, if either factor can be eliminated or seriously modified by climatic change, then the attacks will cease.

It thus becomes more explicable why entirely different climates relieve different cases of asthma, or even the same case at different times. Who has not seen a patient completely relieved by change of climate for a number of years, perhaps, and afterward, the symptoms returning, be again relieved by

another move, perhaps even back to the starting-point? Now, in such case it is very likely that the patient, while strengthened in one factor, was gradually weakened in another till the paroxysm was again developed, to be again prevented by variation of influence.

When, therefore, a case of bronchial asthma presents itself to us, and we are called upon to break the "vicious combination," we try to determine which of the essential factors is most easily removed or modified.

The third factor (the exciting cause) is the one which is apt to engage the attention first, and it may be oftentimes easily removed. When the exciting cause is atmospheric, it may be some variation in the proper constitution of the air, or it may be the presence of accidental emanations, as the pollen of plants, the odor of animals, or animal or vegetable products. When the latter condition obtains and is once recognized, the patient may be able to keep himself out of the reach of the excitant, and, as is well known, an army of hay-fever subjects keep themselves well in this way by an annual exodus to exempt districts.

The well-known susceptibility of asthmatics to paroxysms in the country as compared to the city may likewise sometimes depend upon the presence of vegetable or animal emanations in the country air. In other cases it seems to be the atmosphere containing the most carbonic acid which affords the most relief; hence, the old, crowded portions of the city are looked upon by certain asthmatics as the abodes of bliss. This accords with the recent reports of cases of "dyspnœa" relieved by inhalations of carbonic acid gas.

A change in the density of the air sometimes affords marked relief. It is well known that removal to a high altitude relieves certain cases. These may be such as have for a determining cause some morbid condition of the bronchial area, in which a slight superficial hyperæmia and relative internal

anæmia may relieve the paroxysm, and the variation in pressure at different altitudes may be enough to determine this. Instances of digestive derangement and nervous disturbance as exciting causes of asthmatic attacks are too well known to need illustration. I once had a gentleman patient recently married who almost always had an attack on sexual intercourse. I had another patient who could stop an attack by gambling for high stakes.

In regard to the possibility of so modifying the second factor (a morbid condition somewhere in the respiratory tract, which may be called the determining cause) that the combination shall fail, it may be said that this is sometimes easy and sometimes impossible. When the lesion is accessible to operation, as in the nose, this may be easy; when it is below the reach of operative methods, it may be very difficult or impossible. Perhaps the most brilliant results in the latter field are seen in the cures wrought by the potassium iodide. This remedy is especially efficacious in those cases in which there is evidently a catarrhal inflammation of the bronchial mucous membrane. These cases are also quite susceptible to a proper change of climate—*i. e.*, such a change as we have reason to believe would benefit the bronchial or pulmonary lesion. As to the possibility of so modifying the first factor as to prevent the attacks, I should say that while we may sometimes be successful in warding off the paroxysm by fortifying the nervous system with good hygiene and specific tonics, we will be less successful in this mode of attack than in either of the others. So, also, we may occasionally, in cases in which the neurotic factor is a prominent one, succeed in so modifying it by change of residence as to effect a cure in this way.

So it will appear that in climatic, as in medical, treatment we must make our application to the ascertained condition of the patient, as far as it is possible to diagnosticate this, and not to the name of a disease. There is no climate which is good for

all cases of asthma, and we must carefully consider, when a patient presents himself for treatment, the nature of these three factors in his case, and which of them we intend to modify, and how far change of climate may be able to aid us in this.

INSTITUTIONS FOR THE TREATMENT OF PULMONARY CONSUMPTION IN THE UNITED STATES.

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PHTHISO-THERAPY has not made any decided advances during the last year, although the use of hot air by means of inhalation and the internal administration of pure vegetable creasote have claimed considerable attention of the profession, and both possess a certain degree of value which entitles them to further investigations and clinical trials. Our knowledge in regard to the mode of contagion, and with it the power to prevent the disease, has largely increased. Thanks to the careful investigations of Dr. George Cornet, of Berlin, we know to-day that the phthisical patient *per se* is *not a source of danger* to his surroundings, and that pulmonary consumption is spread broadcast principally by carelessness and ignorance.

The question whether or not consumptives should be treated in institutions conducted for that special object has been discussed both here and abroad, and, while the sanitarium treatment is considered now as giving the best possible chances for recovery from consumption in its early stages, by the profession in Europe, there seems still to exist considerable difference of opinion on that subject among physicians in this country. Dr. George Cornet's experiments will do much to strengthen the case of those who advocate sanitarium treatment for consumptives, and they must necessarily help to overcome such opposition as was expressed recently by my friend, Dr. Samuel A. Fisk, in the president's address

read before the Colorado State Medical Society, entitled "The Cottage Plan of Treating Consumption in Colorado."[1] Dr. Fisk does not by any means advise "cottage treatment" such as will be spoken of in this paper, but he declares himself in favor of treating consumptives in open health resorts rather than in institutions established for that purpose.

Dr. Fisk makes a fatal admission to correctness of the views he expresses, by stating and describing a number of cases which occurred in his own practice where great harm was done by over-exercise, and adding that such irreparable injury might have been guarded against in a properly conducted sanitarium. Dr. Fisk, and with him most practitioners who are honest in their opposition to special institutions for the treatment of pulmonary consumption, seems to overlook the fact that overtaxation of heart or lungs is one of the greatest dangers to which consumptives are exposed, and many lives of patients, doing apparently well, are lost by it. It is probably true, as Dr. Fisk states, that the results obtained in Colorado are excellent, but does that prove that sanitaria are not needed there? Would not the excellent results obtained in Colorado be still better if there were fewer cases where lives were sacrificed by mismanagement?—"cases which recur to each of Dr. Fisk's hearers."

The arguments which he uses against sanitarium treatment are by no means new. They are: 1, that patients do not like to be under constant supervision and control; 2, that a cheerful mental condition has a great part to play in effecting a recovery, and that it is inadvisable to congregate invalids where their thoughts are constantly employed in comparing notes with fellow-invalids and where they are subjected to the depressing influence that necessarily surrounds disease; and 3, that a congregation of phthisical patients render any air, aseptic in itself, very foul and septic. In framing these arguments

[1] The Medical News, May 4, 1889, p. 480.

Dr. Fisk must have been unconsciously influenced by a desire to place the *existing* conditions of his own State in the best possible light.

The first objection raised by Dr. Fisk shows that he does not yet recognize the personal control of consumptive patients—extending, as it should, to the smallest detail of every-day life—as a *conditio sine qua non* for giving them the greatest chances for a cure, though his own cases, which suffered so much by overexercise, etc., should have taught him the lesson.

The second and third objections might be used with just as much force against any *open health resort* where a large number of consumptives live in search of health—as in Denver, Colorado Springs, Georgetown, Aiken, Davos, Mentone, etc.; as a matter of fact, the third objection might very properly be used in favor of sanitaria treatment over open health resorts, where the patients live in badly arranged hotels or boarding houses, and where little or nothing is done to prevent the possibility of having the air loaded with tubercular bacilli, due to the carelessness of patients or their attendants. In a letter to the writer, dated May 12, 1889, Dr. E. L. Trudeau, of Saranac Lake, discussing Dr. Fisk's paper, describes the means employed at the Adirondack Cottage Sanitarium to prevent expectorations from becoming a source of danger to the inmates, and says:

"The proof that with these restrictions no injury results to the patient, lies in the fact that my results are *better at the sanitarium than at the hotels*, and Dr. Fisk's argument, though plausible theoretically, falls to the ground when the most practical test—that of actual results—is applied."

In regard to another argument used by Dr. Fisk, Dr. Trudeau says:

"His other objection—namely, that much depression of spirits must result from seeing so many others suffering from the same disease, is not, in my experience, supported by facts. I find that my patients at the sanitarium suffer from depression no oftener than those I have in

private practice. The former seem to recognize the fact that they are 'all in the same boat,' that a disinterested effort is being made to save them by persons who have extensive experience in the matter, and, as a rule, they aid the physician cheerfully in his task. During the last five years only three patients left the sanitarium on account of home-sickness."

Dr. Trudeau makes this strong statement: "*If anything is to be done for those who are both poor and consumptive, it cannot be done outside of an institution,*" and, after a very careful study of this subject, I have arrived at convictions which induce me to say, even stronger than Dr. Trudeau, *If anything is to be done tending to restoration to health for those who are consumptive, whether rich or poor, it can be accomplished with the greatest promise of success in a properly located and rationally conducted institution.*

To bring about the best results, such institutions should be erected in regions whose climatic influences are known to be favorable to consumptives, places where consumption is known to be rare among the natives, in a moderately high altitude, not close to large cities, in the neighborhood of evergreen forests; they must be located so as to be protected from severe wind-storms; they should have enough cultivated path immediately around them to make exercise possible during all seasons of the year; sunshine and shade should be in proper proportion; the drainage must be perfect, and the water of the purest. The cottage or pavilion system seems to be best adapted to answer all the requirements; all buildings must be erected with their special object in view. The management of such institutions should be intrusted only to physicians of ability, large experience, and great love for their special work.

One feature which is more difficult to overcome than others is the tendency of patients to leave the institution long before they have secured all the benefits the sanitarium can give them. Patients should never think of staying less than seven or eight months, and they should know that six or eight

weeks' residence at the very best of institutions will be of no permanent benefit whatsoever. Changing places on account of the season is not advisable as a rule.

Sanitaria for the cure of consumption have existed for many years in Germany, where Dr. Herman Brehmer started his now celebrated place in Goerbersdorf thirty-five years ago, and where successful institutions are now in operation in Falkenstein in the Taunus, at St. Blasien in the Black Forest, at Reiboltsgrün in Saxony, at Rehburg in Westphalia, in St. Andreasberg, and in Blankenbain in the Harz mountains. In this country Dr. J. H. Tyndale made an effort about ten years ago in Manitou, Colorado, and Dr. H. Gleitsmann before him, in Asheville, N. C., to establish similar institutions, but both failed from lack of professional support.

The interesting paper read by Dr. Alfred L. Loomis before the Medical Society of the State of New York, in 1879, on "The Adirondack Region as a Therapeutical Agent in the Treatment of Pulmonary Phthisis," and the very favorable results obtained personally by Dr. E. L. Trudeau, during a residence for over ten years in that portion of the Empire State, induced a number of benevolent ladies and gentlemen, under the lead and guide of Dr. Trudeau, to make an effort for the establishment there of an institution for the treatment of phthisical patients of limited means, and, in 1884, a moderately sized main building, two cottages (each of which accommodates two patients), and a stable were erected, and given the name "The Adirondack Cottage Sanitarium." Thanks to the philanthropy and the unselfish work of Dr. E. L. Trudeau, and to the kind support given to him by Dr. Alfred L. Loomis and others, this establishment has grown from year to year, and consists to-day of an enlarged main building—two wings having been added to the original—and eight fully equipped cottages, with three more almost completed, thereby offering facilities for over fifty patients. The feature which dis-

tinguishes this from other institutions of the same kind is the fact that the patients are not crowded together in one or two palatial houses, but that they live almost in the open air, in small cottages scattered over quite an area. These cottages are but one story high, elevated from the ground enough to prevent them from becoming damp, with a veranda in front and partly around each; they are supplied with running water, and with open fire-places. The smaller cottages are planned for two patients, the larger ones for four; the latest of these buildings all have a general sitting-room and a separate one for each patient. The partitions between the bedrooms are of mason work, and reach to the ceiling, while those dividing the sitting from the sleeping department are only seven feet high, thus allowing free circulation of air throughout the whole building.

The location of the Sanitarium is a very pleasant one, about 1750 feet above tide-water, covering an area of over eight acres, about one mile from Saranac Lake and seven miles from Paul Smith's; it is situated on a bluff commanding a grand mountain view toward the north and east, well protected from the prevailing eastern winds. The Chateaugay Railroad, running from Plattsburgh to Saranac Lake, a distance of seventy-three miles, was opened about one year ago and has removed one of the very few objectionable features of the Adirondack Cottage Sanitarium, its inaccessibility. Saranac Lake can now be reached from New York *via* N. Y. Central Railroad, almost without change of cars, within seventeen hours, or the trip may be made by Troy steamers which leave New York at 6 P.M. and reach Troy early in the morning, enabling one to be at the Sanitarium about 5 P.M.

The drainage is simple and efficient. The earth closet system is wholly in use and the material is removed to a distance at frequent and regular intervals. All the water is derived from a spring half a mile distant and is brought through iron pipes to the Sanitarium, reaching the second floor of the

main building by gravitation only. All the meals are taken together in the airy drawing-room in the main building; a large supply of pure milk is derived from the cows belonging to the institution, and patients are allowed to drink it *ad libitum* whenever they desire to do so, whether at meals or between them.

Three meals are served daily and the usual bill of fare is about as follows: Breakfast, at 7.30 A.M., consisting of oatmeal or hominy and milk, beefsteak, chops or bacon, potatoes, bread and butter, coffee or milk. Dinner, at 1 P.M., soup, fish or fowl, or roast meat, two vegetables, pudding or fruit in season, milk *ad libitum*. Supper, 6.30 P.M., broiled meat or fish, or hashed meat, eggs, bread and butter, porridge, milk, fruit when obtainable. Alcoholic stimulants are very little used, and, contrary to the very pronounced view of all German observers, not at all in febrile cases. When the circulation is not readily excited and where no marked flushing follows their exhibition, they are moderately prescribed, usually in the form of whiskey or beer at meals. Patients are never allowed to use stimulants at their own discretion.

The climate of Saranac Lake does not differ materially from that of other parts of the Adirondack wilderness, except that the temperature during the cold season is remarkably low and steady, almost all changes from December to April being below the freezing-point. Much snow falls, and windless, cold, snowy days are a marked feature of the climate. January of this year was considered especially warm, the highest temperature recorded was 39° above and the lowest was 12 degrees below zero. The rainfall is a little above the average for New York State, amounting to about 55 inches.

The prevailing winds are westerly and southerly, and very windy days are the exception. The lower the mercury falls the less wind there is usually and the dryer the air becomes, so that exceedingly low temperature, such as 20 degrees below zero, is well

borne by the patients. There is a dry period during the summer when little rain falls and the days become hot, while almost without an exception the nights are decidedly cool, and even during the hottest season there are but few nights when a blanket is not needed.

With the closest attention to hygienic matters, the main reliance in combating the disease is placed on the climatic influences and the life in the open air, this part of the treatment being carried out most thoroughly. Patients are encouraged to live out of doors and are gradually accustomed to inclemency of weather until they go out without regard to bad weather. Winter and summer they often sit—in winter thoroughly wrapped up—from six to eight hours in the open air. As the fever diminishes they are allowed to exercise, but not until then, and always moderately.

The drug treatment is considered as secondary, but is used to meet indications. Dr. Trudeau writes:

"Antifebrin is more used than any other drug, and is considered a valuable help in the restoration of the patient by increasing the capacity for taking food and diminishing the waste by its marked influence on the fever. It is often prescribed for months in 5-grain doses, usually taken at 11 A.M. and 5 P.M. Distinct improvement, more or less permanent, has seemed to follow the use of this drug in about forty per cent. of the cases treated. Next to antifebrin, creasote is perhaps more in use here than any other medicine; unlike antifebrin, it does not agree with almost all consumptives, and its use is restricted by the tolerance of the patient's stomach; when, however, it can be taken in large doses, four or five drops three times daily, a great improvement, not only in the subjective, but in the physical signs as well, has seemed to follow its exhibition in about fifteen per cent. of cases. If it disagrees with the stomach it is never given, even in small doses. Arsenic, cod-liver oil, and digitalis are also prescribed when indicated. The pneumatic cabinet is in daily use at the Sanitarium. Its use is resorted to mostly as a means of expanding the lungs and favorably influencing circulation and digestion in febrile cases in which malnutrition and debility are prominent features, and not as an appliance for the antiseptic treatment of pulmonary consumption."

The actual results obtained at the Adirondack Cottage Sanitarium are of very gratifying character, and compare favorably with those reported by others. A decided and important effect of treatment and climate is observed in the weight of most of the patients; the average gain for six months' stay at the institution is from nine to thirteen pounds. Perhaps the most remarkable effect has been observed in regard to one of the most frequent and dangerous complications of pulmonary consumption —hæmoptysis. Among eighty-three patients treated at the Sanitarium during the last year not a single hemorrhage occurred, and only four cases have been recorded since the institution began to receive patients four years ago.

Up to the end of 1888, 146 consumptive patients have been treated, and the results have been about as follows: Deaths 4, or not quite 3 per cent.; failed steadily 25, about 17 per cent.; stationary or slightly benefited 38, about 26 per cent.; disease arrested 63, or 43 per cent.; and cured 16, or 11 per cent.

Dr. Trudeau writes about these statistics:

"These figures are not, perhaps, thoroughly accurate, but they express on the whole the results, the classification adopted being necessarily a somewhat arbitrary one. Under the heading of cured cases come those in whom both the rational and physical signs of pulmonary phthisis have entirely disappeared; under that of arrested, those cases are put in whom the rational signs of phthisis have been steadily absent for several months with a return to normal strength, the physical signs, though abnormal, being interpreted by the observer as indicative of arrest in activity of morbid processes. This classification is made necessary by the fact that when most patients reach this stage the necessity of earning a livelihood compels them to return to their former occupations. No doubt a fair proportion of these would have ultimately come under the head of 'cured' had they been able to persist in the treatment."

The results of the last year are especially gratifying; of eighty-three patients, two, or 2½ per cent., have died; ten, or 12 per cent., continued to lose ground and returned to their homes; eight, or 10 per cent.,

have improved; sixteen, or 20 per cent., have been so restored as to be able to resume again their various occupations, and twelve, or 14½ per cent., have been cured. The success in curing over 14 per cent. of consumptives is remarkable, and speaks highly for sanitarium treatment in general and more especially for that adopted at the Adirondack Cottage Sanitarium. Not to depend upon the patient's memory regarding important instructions, the following short, plain, and decided rules are placed in the hands of every inmate:

Out-of-door Life.—Patients gradually accustom themselves to leading an out-door life, that is, to remaining eight to ten hours in the open air each day. This should be done gradually, and at first the clothing should be heavy and the exposures to cold or inclement weather moderate in duration. Little by little the open-air sittings and walks are to be increased until the entire day is spent out of doors in all kinds of weather. In stormy weather the sheltered side of the verandas should be used for walking or sitting. When feverish, patients are urged to go out and remain sitting on the verandas well wrapped in suitable clothing.

Exercise.—*Violent* exercise is injurious. When feverish, patients will do well to make as little exertion as possible. *Fatigue*, when induced in persons still having active disease, is sure to be followed by loss of appetite, fever, exhaustion, and even sweating. Severe exercise in hot weather is injurious and may be dangerous. Patients will be informed by the physician how much exercise their case requires.

Food.—If unable to eat at the regular meal hours, patients will do well to drink milk every four hours.

Expectoration.—Patients are required ALWAYS to use the large spittoons in the public rooms and on the verandas, and the pasteboard ones in cottages; the latter should be burned every day in the stoves or fire-places. *Expectorating in handkerchiefs or on the floors, or even on the grounds in the immediate vicinity of the buildings, is strictly prohibited.*

It has been found that while moist sputum is harmless, when it becomes dried it will rise as dust, and may be inhaled. The above directions are given to guard against this result. Patients, for their own welfare and in order to assist in their rapid recovery, *will strictly observe these rules*, and will be liable to dismissal for wilful disobedience in this matter, which involves not only their own welfare but that of others.

Stimulants.—Stimulants are not allowed except under

medical advice. No smoking is allowed at any time in the public rooms or on the piazzas. Patients are requested not to smoke at all unless permission is given by the physician.

The actual results obtained at the Saranac Lake Sanitarium place it in the front rank of institutions of similar character, but it stands before the world as unique, worthy of the highest praise, regarding its monetary affairs. Without endowment of any kind, depending simply upon the voluntary contributions of those interested in its work, strengthened and supported by the untiring labor of love of Dr. E. L. Trudeau and his associate, Dr. C. T. Wicker, of Saranac Lake, the Sanitarium is a charitable institution of the highest and noblest type. The patients are by no means paupers, but the price for board and medical attendance is fixed at such a low figure, five dollars per week, that people of moderate means are thereby given a chance to enjoy the great benefits of this remarkable institution. The promoters and supporters of the Adirondack Cottage Sanitarium deserve the thanks not only of those who have directly been benefited by a stay there, but of everybody who can appreciate the excellent service done by it to suffering fellow-beings.

The board of trustees, consisting of Dr. Alfred L. Loomis, Dr. E. L. Trudeau, Mr. Charles M. Lea, and Mr. Daniel W. Riddle, have charge of the finances of the institution, and their different annual reports show that from 1884 to February, 1889, they have received

From voluntary contributions		$29,565 50
From patients, for board		18,515 28
Total		$48,080 78
Of this sum they have spent for land, buildings, and other permanent investments . .	$20,674 42	
For board of patients and other running expenses . . .	25,033 24	
		45,707 66
And have a cash balance on hand of . . .		$2,373,12

The failure of Dr. Gleitsmann in his efforts to establish a sanitarium in Asheville, N. C., did not prevent Dr. Carl von Ruck from making another trial in the same direction, and it is now a little less than one year since Dr. von Ruck, who had conducted until then a small private hospital for throat and lung diseases in Norwalk, Ohio, successfully, transferred his institution in an enlarged form to Asheville, N. C. The climate there has been the subject of frequent discussions and it is generally agreed that it is almost an ideal one for phthisical patients. Notwithstanding the fact that large numbers of consumptives sojourn thither in search of health, the death-rate from that disease is a remarkably low one: only one native died last year of pulmonary consumption, a negro who came originally from South Carolina, while ten phthisical patients (visitors) died during the same period.

The Ashville institution is known as the Winyah Sanitarium and receives consumptives only. It is located outside of the city proper at the upper end of the natural water-shed of the city, and the inmates escape one of the few objectionable features of Asheville—the dust arising from the unpaved streets during the hot months. The building was originally intended for a hotel; it is furnished with steam heat, hot and cold water in all rooms, ventilating shafts, bath-rooms; it has a wide and high veranda, two hundred and fifty feet long, with west, south, and eastern exposure, and with the newly cultivated park immediately surrounding is well adapted to its purposes. The walks leading up the mountain are graded in such a way as to make the ascent easy, even for weak patients, the rise being one foot in twenty-five, with plenty of seats scattered all over the place. Pine forests are in the near neighborhood and are daily visited by patients; oak covers some of the surrounding mountains; the soil is clay and sand, free from all marshes and standing waters.

Dr. Dettweiler's system of *resting* in the open air

for as many hours as possible, in all kinds of weather, is carried out thoroughly by Dr. von Ruck; easy reclining chairs are provided, together with blankets for the cool season, and many patients are kept lying on the veranda the largest part of the day, until they show sufficient signs of improvement to warrant actual exercise in the open air. The same care which is exercised in the Adirondack Sanitarium regarding the expectorations of phthisical patients is used in Dr. von Ruck's institution, and it is said that the patients are so thoroughly informed of the danger to which they expose themselves and others by carelessly expectorating upon the floor or the sand covering the paths that there is a complete coöperation on the part of every individual. Of course, spittoons are provided in large numbers, but the patients are further supplied with Chinese paper handkerchiefs to be used instead of ordinary ones, and to be burned after being used once or twice. The spittoons are filled with antiseptic solutions and they are emptied and *thoroughly cleaned* at frequent and regular intervals. Patients are reminded never to swallow sputa.

The general nutrition of the patient is carefully attended to, milk is furnished *ad libitum* and can be had at any time; if koumyss is preferred, the latter is given in place of milk. The diet is the same as any first-class hotel would furnish, except that instead of pies good puddings are given and fried dishes are, as a rule, avoided. Especial attention is given to the condition of the digestive apparatus and gastro-intestinal derangements are considered the obstacles which *must* be removed before any progress can be made in the patient's condition. Dr. von Ruck agrees with the writer as to the vital importance of the strictest supervision of each and every patient, and no general plan of treating patients is adhered to; each case receives careful attention and the treatment as indicated by existing conditions. In general it may be said that Dr. von Ruck takes a position midway between Dr. Trudeau

and Dr. Dettweiler regarding the use of stimulants: malt liquors are not at all used in the Sanitarium, but whiskey or brandy of known quality is prescribed in febrile cases. Light wines are allowed at meals, but the habitual use of stimulants is not encouraged. The daily administration of from ten to fifteen gallons of oxygen is resorted to in many instances and has proven to be of value in aiding digestion and developing some appetite in cases where all other means had failed. The pneumatic cabinet is used and considered of special value in phthisical cases where the disease is arrested, or nearly so, where the power of the respiratory muscles is to be augmented to increase expansion and capacity. It is claimed that good results have been obtained by antiseptic inhalations. The use of creasote has been abandoned and Dr. von Ruck states that after many careful and painstaking trials he has never been able to satisfy himself of any favorable influence upon the disease.

From October, 1888, to the end of May, 1889, fifty-one patients have been treated in the Sanitarium, and the results obtained are such as to satisfy the expectations of the most enthusiastic advocate of sanitarium treatment as the best means of curing consumptives.

During the month of December, 1888, Dr. H. M. Wilson, Jr., of Baltimore, undertook to establish a mountain sanitarium for phthisical patients in Tannersville, Catskill, but his efforts were not crowned with success and after a few months of existence the establishment was closed again.

In Colorado two sanitaria are in progress of erection, one at lake Palmer, to be built and conducted by a stock company of which Dr. Charles Denison, of Denver, is the vice-president, and the other one in Colorado Springs, under the management of Dr. S. E. Solly, of that city.

An enterprise somewhat different from other existing sanitaria has been suggested and strongly advocated by Dr. J. H. Sloan, of Santa Fé, New

Mexico. "A course of treatment by which the cure of phthisis pulmonalis is made not a probability but a certainty, in a majority of cases—in fact, in all cases where the disease is not too far advanced."[1] Dr. Sloan, having observed the great benefit which some of his consumptive patients have derived from camping in the mountains near Santa Fé, has determined to adopt out-door camp life under the supervision of a painstaking physician as "a positive cure for consumption." He claims that it is essential to spend at least eighteen months in the neighborhood of New Mexico, and he proposes to have his patients spend fourteen of them in tent life in the mountains in hunting, fishing, etc. The other four months, which are the intervening months of winter and early spring, are to be spent at the St. Vincent Sanitarium, in Santa Fé, when the patient will be surrounded by every comfort. Dr. Sloan has addressed a number of prominent physicians in the East and has laid his plans before them. The principal objection to this proposition is the expense entailed.

DISCUSSION.

Dr. Charles Denison, of Denver: I would like to say that there is a great deal in Dr. Kretzschmar's paper which I can subscribe to and endorse, but I must except his criticism upon what occurred in the Denver Medical Association. The trouble in Colorado is that we have not suitable institutions established for the proper treatment of cases. We do the very best we can. It is usual to have the consumptive patient go out on to ranches, farms, etc., and come in and enjoy some social life. There is a farm on a creek, ten or fifteen miles from Denver, where I have had fifteen or twenty patients. They are out all day. The proper advice is given them before they go out there. There are four or five places up the Platte River. The profession of Colorado are not opposed to sanitaria. We need them out there. In this same line I have to present a proposition from some gentlemen in

[1] Letter by Dr. Sloan of November 10, 1888.

Denver who are interested in a new town where there are some mineral springs, and I should be very glad if their proposition could be accepted. It is, the use of the mineral water, and twenty-five acres would be given to those who would establish a sanitarium there. It is out six miles from Glenwood Springs. I wish to say that I believe the people of Colorado would give every encouragement to people who would run an establishment like this. I would not, for myself, be in such an institution.

Dr. S. E. Solly, of Colorado Springs: I agree with the last two gentlemen. I am not opposed to sanitaria, and I do not think any of my friends at Colorado Springs are. In fact, we are going to have one there. The charge will be only five or six dollars a week. There will be cottages and a central building; and we are trying to get others there. It is something we are all interested in. I did not hear Dr. Smith's paper, and did not know of it until to-day. I leave him to take care of himself. On the ranches, as Dr. Denison says, the conditions are favorable.

Dr. L. Flick, of Philadelphia: The paper is of very great interest to the profession at the present day. The question of sanitaria should not only be considered from the standpoint of those who are sick, but also of those who are well. Probably one of the strongest reasons for establishing sanitaria and consumptive hospitals is to prevent the spread of the disease among the well. Some of you may have paid attention to the mortality statistics of the spread of consumption in England in recent years. Quite a while ago the spread of consumption in England was about fifty per cent. At present the mortality statistics show that the percentage is not so large. By having cases of consumption in their hospitals, there are so many risks of infection taken away from the public. And that is one of the strongest reasons why we should have as many hospitals and sanitaria as possible. The benefit which accrues to the sick person is scarcely so great as to endanger the lives of the well, and especially since we now understand that by sanitaria and consumption hospitals we can benefit the sick without endangering the well.

Dr. A. L. Loomis, of New York: The doctor has given us a very good history of the origin of the Adirondack sanitarium, and it seems to me it is doing the good work which we hoped it would do when it was first thought of.

It gives stimulus to the profession generally to establish such institutions and get them started right. We need such institutions certainly for those patients who are not able to take care of themselves. The larger number who go to the sanitaria are clerks and sewing-girls—a class who cannot pay more than five dollars a week, and it seems to me if there is an association that is doing a noble work it is the sanitarium in the Adirondacks. And there is no reason why there should not be such institutions scattered all over the country. This is a sort of pioneer, and has started the idea that there is a necessity for such institutions. When we look at the manner in which consumptives die in our general hospitals, and the unpleasant life that they lead while they are dying, it seems to me that we are stimulated to help them—if we cannot cure them, to help them to a more comfortable way of dying.

Dr. V. Y. Bowditch, of Boston: I spoke last autumn, at Washington, of my intention to establish a sanitarium at Sharon, eighteen miles from Boston, where I have found that phthisical patients do improve. It is more especially adapted to people who cannot afford to go away to a better climate, and I believe we can accomplish a great deal more in this way than we are able to accomplish at present. My plans are all drawn, and I hope next spring to begin building in this town.

CONSUMPTION AS I HAVE KNOWN IT.

By E. P. HURD, M.D.,
OF NEWBURYPORT, MASSACHUSETTS.

On the south side of the St. Lawrence, but separated from that river by an intervening flat country or valley some thirty miles in extent, inhabited by French Canadians, is a narrow tract of land bordering on the New England States and divided into two portions by the St. Francis; this region, diversified with hill and dale and extensive woods, is known as the Eastern Townships of Quebec.

About the latter part of the last century companies of enterprising settlers, mostly from the Northern States, endeavored to effect clearings in the dense forests and make for themselves homes in these townships. Their privations were great, and it was only by years of hardship and toil that they succeeded in overcoming the difficulties of their environment and obtaining for themselves and their families the ordinary comforts of life. Want of suitable food, even of sufficient clothing, sometimes proper shelter, together with the rigor of the climate (for six months of the year is winter), produced the usual debilitating effects on the constitution of parents and offspring, and consumption became the scourge of the Canadian colonist.

As one of the descendants of an Eastern Townships pioneer, I witnessed much of this dire disease in my younger days. The malady appeared in both the acute and chronic forms, and when once it had manifested itself nothing could resist its progress. I have seen whole families disappear, one by one, by pulmonary phthisis; there were few families that did not lose thereby one or more members. Those hardy backwoodsmen were prolific, but overwork

often prematurely undermined them, and their offspring was a physically deteriorated stock. Many of these pioneers were given to alcoholic excesses, and thereby further impaired their constitutions, and the children of such parents were neurasthenic and phthisically predisposed. Instances like the following were common:

Edmund B. emigrated from Western Massachusetts to Canada in 1792, when a young man, and was of healthy, non-tuberculous parentage. The account of the hardships undergone till a sufficient clearing could be effected, a suitable domicile erected to take the place of the primitive log hut around whose fireplace seven children shivered with the cold, would take more time than is allotted to this paper. The nearest grocery and grist mill were five miles distant; the roads could only be traversed on horseback; the winter's snow-drifts were appalling. The family were often out of flour; fresh meat was scarce, though the rivers in the summer were stocked with trout; in the warm weather, when the hardest work must be done, salt pork, salt fish, potatoes, beans, and buckwheat, constituted the chief food. New England rum was not altogether a rarity, though the principal intoxicant was potato whiskey. He early acquired a fondness for ardent beverages, and died prematurely from the effects of intemperance and overwork. His children all died of phthisis before attaining to old age; the grandchildren have been largely phthisical, every family counting two or more victims, though some have passed the middle life and are healthy; and among the great grandchildren numerous cases of phthisis have occurred, although on the whole, with the possession of better homes and more comforts, the thirty surviving descendants seem to be attaining immunity from that disease.

Among the elements which powerfully conduced to the development of phthisis in these settlers, rigor of climate deserves especial mention. Sudden and violent changes of weather are very common; the wintry cold, often as low as —30° F., is very protracted; the air is often damp as well as cold, especially during spring thaws; the houses are frequently

too much shaded from the sun by being surrounded by trees. The settlers were greatly subject to colds and catarrhs, and most cases of consumption commenced with the latter. Some, coming from warmer countries, never became acclimated, but speedily succumbed to phthisis; others would withstand the severity of the climate for a series of years; when, however, age began to manifest itself, and the vital forces to deteriorate, catarrh or a sudden hemorrhage would usher in the familiar train of morbid phenomena. Others, again, seemed to adapt themselves sufficiently to the climate, but entailed non-adaption on their offspring, as if, in the struggle with environment, they were just equal to the occasion, but had no surplus energy to transmit.

Instances under the last category are very numerous. An interesting circumstance is that consumption is really becoming less and less frequent among the descendants of these early settlers, a fact, to which I allude on the testimony of physicians long in practice in the Eastern Townships. Another gratifying circumstance is that consumption is more curable than it used to be. Cases like that of my own brother are not infrequent. This young man left his home and went to Colorado when apparently in confirmed tuberculosis; there was extensive dulness and moist crackling at the apices, with the general symptoms of advancing phthisis. A tramp of six months over the Colorado Mountains brought a return of appetite and strength, and a disappearance of pulmonary symptoms; twenty years have now elapsed, with no return of the disease. It has been found that the cold-dry-climate cure of consumption suits best. Patients have never been, to my knowledge, permanently benefited by going to a warmer climate; but many have sought restoration by change of climate when they would have been better off at home, and in my judgment the existence of a persistent high temperature—the thermometer being habitually above 100° F.—is a contraindication to going abroad for relief, especially if the sanitary resort be distant.

At the present day, consumption is especially frequent among the Irish and English immigrants of the Dominion, who have to undergo the same slow process of acclimatization as the original settlers. This was my experience while practising in Danville, Quebec: while there was considerable consumption among the descendants of the early inhabitants, there was far more among the Irish who had but recently come to the country.

A point of importance in this connection is this: that consumptive residents of this inland region are often signally benefited by a sojourn at our New England sea-coasts.

Although I have but little acquaintance with the French Canadian part of Canada, I am assured by practitioners of eminence that phthisis is infrequent among the *habitants*, that it is, in fact, "dying out." It is, however, quite prevalent among the French Canadians of cities, owing chiefly to unhygienic surroundings. A physician formerly practising in the city of Quebec writes me: "Most cases of consumption that have come under my observation have been among the Irish and English; the disease is as common in the second generation as in the first. I have met this disease as frequently in the well fed as in the poorly fed, but in almost every instance I could trace the disease to defective hygiene, improper ventilation especially. Your theory, that want of acclimatization may be a factor in its genesis, is true as regards the habitants, for consumption was far more frequent among them formerly than now; and it is well known that consumption was very rare among the French ancestors of this race. In Quebec, consumption is not common, and this we attribute to the healthy location of the city, and its excellent drainage."

If, thus far, I have said nothing about the tubercle bacillus and contagion, it is because I attach much more importance in the matter of etiology to inherited or acquired vulnerability than I do to the bacillus. He, of course, would be a hardy man, if

not very foolish, who, after duly reading and weighing all the evidence *pro* and *con*, would say he disbelieved in the causal agency of Koch's bacillus tuberculosis. Doubtless, the presence of the latter is necessary to the constitution of the disease as such, but that consumption really begins in a preparation (or degradation) of the organic culture soil, in a condition of malnutrition which is *the first cause* of the disease, is to me unquestionable. Thus far our principal therapeutic successes have attended the endeavor to make the culture soil unfit for the bacillus. It was early understood that the best that we could do for our patients was to raise the vital forces and improve the nutrition of the parts that are the favorite sites of tubercle. We cannot reach the bacillus to destroy it by antiseptics, but we can sometimes, by promoting nutrition, make its haunts uncongenial; we can render more efficient the resistance of the organic protoplasts. This is accomplished in a variety of ways. If I may be permitted to deduce rules from my own limited experience, especially since I have been a New England practitioner, I would say that, for many of our consumptives too poor to afford long journeys, we can do no better than to recommend them, if possible, to get away into the country, and to change their habits of living from indoor to outdoor life. It is well ever to bear in mind, in making a choice of climate, that, as a rule, that climate is best for an invalid which is the most unlike the one where he acquired his disease. Even this, however, must be taken with great reservation. Many of our consumptives, foreigners, have contracted the disease by habitually breathing the vitiated air of factories and workshops. Others are cases of inherited or acquired phthisis, where the patient, native to this soil, has abandoned an outdoor for an indoor life. Here, a return to an open-air occupation would be likely to benefit. On the whole, the formula of Celsus is the most sensible, and is open to no objection: "The worst air for a patient is that which has given

rise to the disease." This gives us etiological hints sufficiently easy of application.

As regards diet in phthisis, there is no subject of greater importance. Consumption being essentially a disease of malnutrition, often engendered by insufficient alimentation—food meagre in quantity or quality, or both—it is evident that any attentions that do not comprehend careful supervision of the ingesta, will be to little purpose.

My note-book contains many striking cases of consumption in the early stages among French Canadians, where putting the patient on a full diet, of which fresh meat was a large component, with pure cod-liver oil (made in Newburyport) and four ounces daily of old West India rum, did wonders for them in a short time. The meat was often given in the shape of raw beef, scraped or pounded into jelly, and mixed with a little rum or brandy. Of this, sometimes three or four ounces would be ingested during the twenty-four hours. Of milk, the more taken the better; often a little rum or whiskey was dropped in when the stomach of the patient would bear it. Cream is an excellent dietetic adjuvant when it can be obtained. Cod-liver oil is a first-class nutrient, and is always beneficial when it is well borne and does not disturb the appetite; unfortunately, however, but a small proportion of patients can take cod-liver oil long enough, or in sufficient doses to do them much good. Some of the malt extracts have seemed to me of much utility; these probably act by furnishing to the absorbents a considerable quantity of easily assimilated nutriment.

I have not seen any evidence that phthisis in man is ever contracted from a similar disease in cattle; in fact, I should say that bovine phthisis is almost unknown in Canada, and very infrequent in New England. Nor do I remember ever to have witnessed a case that I could clearly trace to contagion, *i. e.*, where a healthy non-predisposed subject contracted the disease from a phthisical person. I have seen consumption go through families, but here

a common cause could be alleged. At the same time, there is no doubt that inhalation of the dried products of expectoration may produce the disease in man as well as in certain of the lower animals, for the essential infectiousness of tubercle and tuberculous sputa is a fact that has been well demonstrated in our time.

In studying the march of consumption in New England, I select the city of Newburyport, Mass., as the type of an old-fashioned New England city, with a population that has been nearly stationary for the last fifty years. If there has been any change in the population it has been in the direction of an increase of the foreign element, coincident with the development of manufacturing interests during the past two or three decades. A considerable part of the native population occupy homes that have been family inheritances for several generations. An old seaport and fishing town, many of the leading inhabitants with pride trace back their ancestry to the original settlers of this country. Add to this that the city has salubrious surroundings, and is remarkably free from malarious and zymotic diseases, yet from its situation (on a declivity near the ocean), is exposed to chilly winds and inclement weather, and thus presents as much as any city in the commonwealth the suitable climatic conditions for the development of consumption.

I have at the cost of considerable time and labor compiled statistics of the mortality from pulmonary phthisis in this city for the past twenty-five years. The preparation of statistics always includes the expenditure of much toil and research, and few readers are interested in the presentation of a formidable array of figures; all, however, are anxious to obtain the results. It is understood by those who have ever compiled such statistics that only approximate accuracy can be obtained, for death returns (often made hap-hazard) are notoriously unreliable; it is, however, true that such as record consumption are likely to be the most reliable of any. Add,

moreover, that no very startling conclusions can be expected from statistics embodying the data of only a brief series of years, while hints may certainly be obtained as to the tendencies of great natural laws which slowly but surely work out their results.

First, then, my statistics show a total mortality from all causes, for twenty-five years, of 7234; the average population being 13,509. Of these deaths 1235, or very nearly one-sixth, were from consumption. Consumption, then, is still the most potent cause of mortality here as elsewhere.

There is general harmony between these statistics and those published by Dr. J. Curtis in the *American Journal of Medical Sciences* more than forty years ago. From Dr. Curtis's table it appears that deaths from phthisis in Boston during the twenty-eight years from 1821 to 1848 inclusive, were 1 in 5.76 of all deaths, or 17.36 per cent. Dr. Maynard, from an examination of the statistics of New York for thirty years prior to 1850, gives the proportion in that city at 1 in 5.54, or about 18 per cent.

Dr. C. M. Snow, of Providence, R. I., in his valuable notes on the causes of death, in the city registrar's report, 1881, gives an average percentage for twenty-six years, 1856-1881 inclusive, of 16.69 per cent. According to my figures, for the twenty-five years ending December 31, 1882, the average death-rate from consumption has been 1 in 285 of the whole population, or 3.77 in each thousand persons. Dr. Snow gives the average death-rate in Providence for the twenty-seven years, 1855-1881 inclusive, as 1 in 319, a considerable decrease over the average annual rate for the fifteen years, 1840-1854 inclusive, which was 1 in every 209 inhabitants.

The following table shows the ratio of mortality from consumption among the native population for five periods during the term of 25 years. The ratio of mortality among the foreign population is also shown; by comparing the latter statistics with the former, it will be seen that the death-rate from consumption among persons of foreign parentage is

far in excess of that of the native population. The foreign population of Newburyport is estimated at 3000; it is, however, premised that the foreign element of any community is very variable and fluctuating, especially in manufacturing towns, where seasons of great business activity alternate with seasons of great depression. There have been years when the mortality from phthisis among foreigners has been very great, as in 1879; years when there has been an unusual influx of foreigners, chiefly Irish and French Canadians, who, bringing to this country constitutions enfeebled by hardship and privation, fell easy victims to the rigor of our clinate. It is not an uncommon experience for physicians to record two and even three deaths from consumption in the same family and in the same season; nor is it unusual for parents coming originally from Ireland, and free from all hereditary tendencies to consumption, to see their sons and daughters succumb, one after another, to the same disease.

Population of American Parentage.

1858.	One death from consumption in				378
1865.	"	"	"	"	" 564
1870.	"	"	"	"	" 252
1875.	"	"	"	"	" 300
1880.	"	"	"	"	" 351

Population of Foreign Parentage.

1858.	One death from consumption in				273
1865.	"	"	"	"	" 150
1870.	"	"	"	"	" 161
1875.	"	"	"	"	" 176
1880.	"	"	"	"	" 136

Yearly average among persons of American parentage, one death from consumption in 336. Yearly average among persons of foreign parentage, one death from consumption in 179.

The lesson taught by these tables is that consumption is far more prevalent among foreigners than among natives; as far as the latter are concerned, there is a gradual decrease in the death-rate from this disease. This truth is still more apparent from

Dr. Snow's carefully prepared statistics for a similar term of years; any difference in detail being possibly explicable in part by the fact that the climate of Newburyport is somewhat more severe and changeable than the climate of Providence, and, as a consequence, is more trying to foreigners. Dr. Snow's table gives, among the population of American parentage, in 1875, one death from consumption in 415; this is contrasted with the much higher mortality from the same disease in the foreign population, viz., 288. In 1880, the ratio among foreigners was one death from consumption in 268; among native-born Americans, one death from consumption in 435.

The words "native population" refer to decedents of American parentage, not always, however, acclimated to the locality where they died. In fact, reference to the mortality records shows that many of these decedents were comparative strangers to the locality, emigrating from homes more or less distant. Persons, for instance, coming from inland regions, often find our east winds and fierce northwesters very trying; and latent predispositions to phthisis are very likely to be awakened, especially if there be much exposure to our chilling spring weather.

The relative infrequency of consumption among the descendants of families that have many generations been fixed to the soil, is a conspicuous fact. Such families, for instance, largely of British stock, as the Littles, the Lunts, the Withingtons, the Lowells, the Woods, the Simpsons, the Pikes, the Moodys, the Knights, the Spaldings, the Stones, the Pettingells. I have inquired concerning the mortality records of all these families, and many more native to this region, and find consumption almost unknown for several generations.

It is almost too much of a truism again to repeat that, in the struggle for existence the strongest and fittest survive. Nature by a process of selection gradually weeds out sickly and infirm—those not adapted to their conditions—letting only those live

who by inherent vitality can successfully cope with the difficulties of their environment. This truth is exemplified in the history of consumption in New England, which seems to be one of Nature's principal agencies for the removal of the non-adaptable. The native race is becoming more hardy, at least in respect to resistance of severities of climate, while immigration is furnishing, and will long continue to furnish, the customary quota of deaths from consumption.

From what has gone before, it will be perceived that the typical consumptive of my experience has been the man or woman with feeble organization, inherited, innate or acquired, who by non adaptation to the rigors of climate, becomes a victim to the bacillus tuberculosis. It must, however, be admitted that a condition of debility as we commonly understand the term, does not invariably seem to precede the attack, or, to speak more correctly, the invasion of Koch's bacillus. I have now and then seen a man apparently in perfect health, stricken down in the flower of his manhood with progressive tuberculous disease; a severe cold, an attack of measles, hæmoptysis, being the immediate precursor. Not every debilitated youth becomes a victim to phthisis, and never in the past was neurasthenia more prevalent in New England than to-day. Perhaps the state of the pulmonary tissues as to nutrition, their resistance or non-resistance to the specific disease germs, has more to do with the prevention or causation of tuberculosis of the lungs than any other factor. In some instances these naturally delicate organs may be weakened by exposure to severe atmospheric changes and succumb to the microbe of phthisis, albeit the other organs and tissues may be in a good state of nutrition. Such cases are, I believe, apt to be acutely inflammatory in their type.

In other instances, the lung may be the soundest part of a feeble and sickly organism, and sturdily resist every destroying agency.

The analogy of certain other infectious diseases,

as anthrax, would lead us to look for an acquired immunity in the course of successive generations constantly exposed to the same predisposing and exciting causes; anthrax once devastated the flocks of Algiers, which have now outgrown their susceptibility to this disease.

Excessive dampness and moisture, especially cold dampness, is an undoubted factor of considerable importance. I have more than once noticed unusual prevalence of the disease in damp, much shaded localities, especially in houses built on cold, clayey soil, with little sunshine (the sun's rays being intercepted a part of the day by hills, houses, or trees), and exposed to bleak winds. I need not say how much our venerable Dr. Bowditch has insisted on such conditions as being factors of prime moment in the etiology of consumption. In the light of now prevalent etiological notions, we can, of course, regard excessive atmospheric moisture only as one of the predisposing causes.

DISCUSSION.

Dr. A. L. Loomis, of New York: I would like to say I think Dr. Hurd has thrown out some very strong arguments, and I would not care to have the paper passed by without being noticed. It seems to me that those facts and statistics, especially his family statistics, go to show that pulmonary phthisis is a contagious disease.

OPEN-AIR TRAVEL AS A CURER AND PREVENTER OF CONSUMPTION,

As Seen in the History of a New England Family.

By HENRY I. BOWDITCH, M.D.,
OF BOSTON, MASS.

"For my own part, I intend to hunt twice a week during my stay with Sir Roger; and I shall prescribe the moderate use of this exercise to all my country friends as the best kind of physic for mending a bad and preserving a good one."—*Sir Roger de Coverley*, chapter xiii. p. 101, Goldschmidt, Edinburgh, 1889.

It is a curious coincidence that, at the same meeting of the Climatological Association, the President should give you some information gleaned from my recorded cases as to the connection of pleurisy with phthisis, and I should present the history of my father, cured, as I believe, of severe phthisical symptoms by a journey in an open chaise, and by persistent daily walking of from five to six miles during the rest of his life. In connection with this I shall endeavor to show that, by the same persistent open-air treatment of his children during their periods of growth, he was able to prevent the occurrence of the same disease in a large number of his descendants, who, in consequence of himself and his wife being tuberculous, and also first cousins, must have been very strongly *predisposed* to it.[1]

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[1] I am well aware that, since the brilliant discovery by Koch of the bacillus tuberculosis, some writers deny that phthisis *can* be inherited. But surely this opinion I cannot think true. All my medical experience is directly against it. Moreover, we all admit that a certain deterioration of the vital power of the whole, or an abrasion of a part of the body, is necessary for the life and propagation of the bacillus and consequent production of *tubercular* phthisis. Hence, as far as active out-of-door life tends to the production of perfect health in a person or a family, it would seem, *à priori*, that the course pursued by my father, which undoubtedly was of such infinite service in his own case toward the *cure* of

I have a record of this journey as kept by my father in 1808, when he was thirty-five years of age. I found it recently, tied up in a bundle of old papers, which had been resting quietly hidden for over half a century. It is a very compact, precisely written statement of that journey, showing, indirectly at least, its benign effects upon him.

It is eminently suggestive to me of the proper treatment of certain cases of phthisis, and in the hope that it will be suggestive to others also, I now lay it before this Society. To some sensitive minds it may seem to be of too private and personal a character to be placed thus freely before any public assembly. I have no such feeling when questions of human health and happiness are involved.

In 1808 my father was undoubtedly threatened with consumption. He had cough, hemoptysis, anorexia, diarrhœa, and general malaise, with fever and great debility. On August 29th of that year, when thus ill, he started, with a friend as his companion and driver, in an open, one-horse chaise for a tour through New England. At that time it will be recollected that there were no cars, and travel was had in one's own carriage or in public coaches holding nine persons. These were driven over turnpikes or private roads. There were hotels, more or less comfortable, at which travellers could sleep and get food in every town. This record lets us, more or less distinctly, into the feelings, physical and mental, of every day of the month during which the journey lasted. A glance at the map[1] will show that

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phthisis, must have been of great use to his children as a *preventive,* by making them all robust from their earliest years. By so doing he *opposed any tendency* to poor constitutions, impressed on them from their births, which tendencies, if they had not been counteracted from early life, would, I believe, have made his descendants easy recipients of phthisis.

[1] A large map was shown at the meeting marked by circles on the towns where the nights were passed. These circles were entirely black at first, indicating great depression of mind and body, and they became gradually lighter, as the patient got better. Those over the last half of the journey were not only free from any shade, but were surrounded by a red border, indicating the comfortable feeling of returning health.

the travellers went from Salem, Mass., down into Rhode Island, thence by way of Connecticut up through the hills of western Massachusetts to Albany and Troy, and back through Massachusetts to New Hampshire, Vermont, and Maine, and then to the home from which he started. During the trip he traveled 748 miles, passed through 113 towns and cities, and the time spent in this daily open-air exercise was thirty days. During that time he went through all stages of feeling of mental discouragement and of physical weakness up to a real enjoyment of life.

Allow me to refer briefly to these changes. Starting from Salem (black) with the prominent signs of phthisis, he was so much exhausted, and had hemoptysis after a drive of twenty-five miles to Milton, that the landlord of the hotel advised his friend to take him home to die, as he could not possibly drive to Taunton the next day, as proposed. (I derive this last statement, not from the journal, but from family tradition.) The travellers were both of them plucky, and not only made that next day's journey, but the sick man felt somewhat better at evening, and notes in the latter part of his record the condition of the country before arriving at Taunton. His fifty miles since leaving Salem had evidently done no harm, but rather good. Anorexia had gone, as he "dined" (with relish, *apparently*, because he could get nothing else) "on bacon and eggs." Arrived at New Bedford next day, he feels able to visit a friend. He examines a factory. He makes remarks on the inhabitants he met and their employments. Though still having some fever, he feels so much better that much darkness is removed from the circle. Still more refreshed after a night's sleep, and having still less fever, he visits a coal mine recently discovered in the vicinity.

From this time there is almost steady improvement. He visits Newport (109 miles from Salem), admires the harbor, but notices its lack of shipping (to which in Salem with its fleets of ships and their

long, wealth-bringing East India voyages he had been long accustomed). At Providence (141 miles from Salem) he finds friends and has pleasant meeting with them. Nothing is said of illness. On the contrary, he has his "Rosinante harnessed" the next day, with the intention of driving *out of his intended route*, in order to visit the cotton factories at Pawtucket Falls. Arriving at Hartford (195 miles from Salem) he is altogether better, finds good fare and a fine hotel. He meets there the judges in their circuit, and has pleasant and profitable conversation with them at the hotel at which they were stopping for the night.

At New Haven (256 miles from Salem, and twelve days of open-air travel) he calls on President Dwight, of Yale College, and regrets that the eminent Prof. Silliman is absent. He visits the library, and finds it wanting in most of the modern English, French, and German scientific works he had been so long acquainted with, and had studied in Salem. At New Haven he makes, for the last time, any allusion to his health, in the following words: "I have a little pain in my breast, but my appetite and general health are good."

After this date, till he arrived home, his record seems like that of a common traveller. He makes no complaints, but describes brightly the places, friends, and others met, exactly as if he were well and travelling for pleasure only.

At Albany he makes an especial and extra journey to Troy with a party of transiently met friends, leaving his chaise for nearly two days in the former city. He found the trip "very pleasant." On return to Albany from Albany to Troy, he had driven 432 miles in nineteen days.

Starting for home, he appears delighted while travelling through a "picturesque" country and meeting at the various hotels intelligent company whose society he was able generally to enjoy.[1] He

[1] This was not always the case, however, for at one town he met one gentleman, "a member of Congress," who was apparently

visits the village of Canaan, and describes in detail what he saw of the Shakers, and heard an extraordinary sermon delivered *at* him, among others, as one of the "outside mankind." I forbear quoting from it. His appetite was becoming ravenous; they would not give him at one tavern, as he says, "half as much as I wanted for my dinner." Finally, he arrived home at Salem, so the record states, "in much better health than he had when starting."

His subsequent course in regard to himself and to his children induces me to believe that the journey, though benefiting him immensely, had not wholly cured him; but it had proved to him the absolute need he had of regular, daily, physical, open-air exercise. Afterward, under walks of one and a half to two miles, taken three times daily during thirty years of life, all pulmonary troubles disappeared. He died in 1838, from carcinoma of the stomach, one lung presenting evidences of an ancient cicatrix at its apex, both being otherwise normal. He was sixty-five years old—*i. e.*, thirty years after the journey.

Having thus experienced, in his own case, the vast benefits resulting from constant, regular exercise out of doors, he apparently determined that his children should be early instructed in the same course. As soon as we were old enough, he required of us daily morning walks down to a certain well-known divine's meeting-house, about three-quarters of a mile, or a mile, from our home. I remember them very well for the tricks played with my brothers on our way down, and for sundry twinges of conscience, felt even at this moment, at the thought that we sometimes decided that the *sight of the "weather-cock* on Dr. Bentley's steeple," though seen more than a quarter of a mile from our proper destination, was near enough to our father's directions!

If any of us, while attending school, were ob-

stupid enough. "He scarcely spoke a syllable during the evening."

served to be drooping, or *made the least pretence* even to being not "*exactly well*," he took us from school, and very often sent us to the country to have farm-life and out-of-door "play to our hearts' content." Once he told me to go and play, and to "stay away from study as long as you choose." In fact, he believed heartily in the old Roman maxim, of a "a healthy mind in a healthy body."[1] In consequence of this early instruction, all of his descendants have become thoroughly impressed with the advantages of daily walking, of summer vacations in the country, and of camping out, etc., among the mountains. These habits have been transmitted, I think, to his grandchildren in a stronger form, if possible, than he himself had them.

You will readily agree with me that such habits are among the surest guarantees against the prevalence of phthisis in a family. Before detailing the actual result of these habits upon our family, I must state the prospective chances of our escape from the malady. My father married his cousin, who, after long invalidism, died of chronic phthisis in 1834. Certainly a consanguineous union of two consumptives foreboded nothing but evil. They had eight children (born respectively in the years 1805, 1806, 1808, 1809, 1813, 1816, 1819, 1823). Two (born 1809 and 1813—*i. e.*, one and five years after the journey) died, one at eleven and the other at birth. All the others either are now alive, or they arrived at adult life and married and have had children and grandchildren, but not a trace of phthisis has appeared in any of these 93[2] persons.

Now I ask the consideration of this question: To what cause can we attribute this extraordinary immunity from the disease which is generally regarded

[1] Mens sana in corpore sano.—Juvenal.

[2] The number of their descendants amounts now (1889) to 8 children, 31 grandchildren, 50 great-grandchildren, 4 great-great-grandchildren—total 93. It may be noted that of the two who were born in 1809 and 1813, one died when eleven years old (1820) and the other at birth (1813), while the writer and reader of this paper was born twenty days *before the journey began*.

as showing the influence of heredity and of consanguineous unions more, perhaps, than most other complaints?

If any one can see any other explanation than the influence of this original journey upon the health of one of the great-great-grandparents, conjoined with his wise management of his own health subsequently and his fastening upon his descendants, even to the present day, the virtues of open-air life, I hope he will frankly say so. Truth should be forever our motto, and the man who will convince me of the error of any scientific, or apparently scientific, statement I may utter, and which, if not corrected, may lead others astray, I regard not as an opponent but as my foremost friend.

I submit these facts and thoughts for candid, mature, and *practical consideration* and *use* in the treatment all are called to make of this terrible scourge of all parts of this Union. For my own part I fully believe that many patients now die from want of this open-air treatment. For years I have directed every phthisical patient to walk daily from three to six miles; *never* to stay all day at home unless a *violent storm* be raging. When they are in doubt about going out, owing to "bad weather," I direct them to "*solve the doubt*, not by staying in the house, but *by going out.*"

A cloudy day, or a mild rain, or the coldest weather should not deter them. If the weather be very cold, let them put on respirators before leaving the house and be thoroughly wrapped in proper clothing for the season. I direct them never to stand still and gossip with friends in the open street, as by so doing they are much more liable to get a chill than while walking. Hence, summer and winter alike, my patients usually get plenty of fresh air uncontaminated in a great part, at least, by the previous breathing of it by themselves or by other occupants of the house. This course, I believe, might be pursued in any part of our common country. I am certain that I know of patients who have become

well and able to attend to the business of life under this course. May we not also at times send our patients over short distances in open vehicles, instead of thousands of miles off in ill-ventilated cars to an entirely different climate? Have any of us ever sufficiently tried this open-air journeying *at home*, so to speak—that is, in the region of the country where the patient lives, wherever that may be?

Certainly this proposed course has, at least, two sound physiological principles in its favor, viz.: A gentle exercise, for many hours in each day, of the whole frame, and an almost perpetual change of air drawn in with each respiratory act, as occurs while driving in a carriage, open at the front, and in walking. I have no objection to drugs, properly chosen, and I almost always administer them; but if the choice were given me to stay in the house and use medicines, or to live constantly in the open air without them, I should infinitely prefer the latter course in case of my being threatened with pulmonary consumption.

DISCUSSION.

Dr. A. L. Loomis, of New York: Certainly Dr. Bowditch has given us a very interesting and instructive family history, but he has also given us a great principle in the treatment of pulmonary cases, a principle which he has by his writings been instilling into the profession so many years that we begin to think that it is a part of the treatment of phthisis. Very few, I suppose, at the present time, very few physicians, would think of treating phthisis in the house or indoors, recognizing that an out-of-door life is the great aid in the successful treatment of the disease. Hereditary tendencies undoubtedly have very much to do in furnishing the condition for the development of phthisis; and there are very few of us who are free from such hereditary tendencies. I am the only representative of my own family. All my relatives have died of phthisis—father, mother, sisters, and brothers. And I early commenced going upon the same principle, and I undoubtedly received the im-

pulse from Dr. Bowditch, of living as far as possible out of doors. Every man who has such a tendency, I believe, has a time when he has to struggle. And that time came to me at thirty-two, and I required a life in the Adirondacks for some months, and I went there and regained my health, or overcame my tendency, so that from that day to this I have had no phthisical manifestations. And it seems to me that that is the general history of hereditary tendencies,—that the time comes in almost all those persons when they have their term, and when if they have been living an in-door life before they have to change it and go more into an outdoor life than they did before. Certainly this is a very suggestive history, and one that must do us all good.

Dr. Charles Denison, of Denver: I think there are perhaps a great many physicians in Colorado who could join this meeting of personal experiences, and state the wonderful benefit that has accrued to them through the influence of climate, and every one of them would give as the principal or important factor the very principle that has been so excellently illustrated in the history presented to us—that is, of living out of doors. As personal experience is particularly called for, I may say that the struggle which Dr. Loomis mentioned came to me once at the age of twenty-six, when just after the commencement of the practice of medicine and a year's work in a hospital I took a journey and lived out of doors three or four months. The result in the first case was a gain of eight pounds and ability to ride forty miles a day, sleeping on the ground the most of the time and getting so brown and strong that my friends did not know me when I returned to Denver. There are a great many cases that come to my mind of people afraid to go to high altitudes. Particularly I have in mind a gentleman I met who was so ill that he had to be carried on a mattress, but he was bound to make the trial; he was put into a covered canvas-top wagon, and full of hope started on his journey. After the fourth day he rode on horseback nearly all the way. From the history of the case I think it was probably a confirmed case in the third stage of phthisis. I met this gentleman in after-life enjoying good health in Texas. There have been a good many instances of this kind of life, which, certainly, so far as my experience goes, were always successful. Once in awhile patients may make too long a journey and try

to do too much and they may over-do and be damaged thereby. There is no healthier life in the West than that which the cowboys live, but you cannot tell an invalid to do that.

Dr. S. E. Solly, of Colorado Springs: This seems to be an experience meeting. Thirty-five years ago, when I was living in London, I was pronounced a consumptive by three leading physicians. It set me thinking and I went down to an old country squire's place and I staid there, riding his horses and drinking good port wine until I felt better. After that I always thought a good deal of open-air exercise. After my father's death, having worked very hard for ten years, it began to tell on me. My friends told me to get out of it. I was invited to go to Colorado and accepted the invitation. That was fourteen or fifteen years ago. If I could have kept up my out-of-door exercise again out of London I think I need never have gone to Colorado.

Dr. T. S. Hopkins, of Thomasville, Georgia: One instance showing the benefit of out-of-door life in consumption: In 1853, a brother-in-law of mine was completely run down from consumption. He asked me what to do. There were some friends going out buffalo hunting. I told him to go. From Kansas City he wrote me that he could not live three weeks, that he was completely run down. Six months afterward he wrote me a letter saying he was feeling better than he ever did before. He got so in a short time on the prairies that he could kill his own buffalo. In two years afterward he came back and married. He went down on the coast of Georgia and died. If he had lived in Colorado I think he would have recovered.

Dr. James R. Leaming, of New York: I am very sorry that I cannot speak, but I entirely uphold the doctrine of outdoor exercise. I remember that Dr. Loomis came to me at the time he was first breaking down. I examined his chest and found there were distinct râles. I think it was on the right side. He proposed then to go to the Adirondacks. He came back, I believe, entirely well from that time. I am, of course, a living example of outdoor exercise, and I have endeavored to teach as I have lived.

Dr. F. I. Knight, of Boston: Dr. Bowditch told me he was going to read this paper and he asked me to criticise it, and if I could find any fault with it he hoped I would say so. I certainly cannot oblige him in that

particular. I think his conclusions are certainly fully warranted by the premises. It seems to be the beginning of a change which is to modify our mortality rate. The only place where criticism would come in would be in the application of this principle, which patients are too often allowed to make for themselves. It reminds me of a case of typhoid fever where the patient got hold of a nice steak and he got well. The doctor put down in his book, "Beefsteak good for typhoid fever." The next case he had he gave beefsteak, and the man died, and the doctor put down in his book: "Beefsteak good for typhoid fever, sometimes." One of our doctors used to say the best thing for the inside of a man was the outside of a horse, but that is not true of all tubercular patients, and we do find cases where there is high temperature where it would be foolish to tell a man to ride horseback. We should insist upon placing all the patients whom we send away under some professional supervision, so their movements may be watched by competent men, and we should take the same care of those who remain at home. I have known many patients to be sent away when they were in such a condition that it would do them the most possible harm. It would have been better for them to remain in bed. A tubercular patient presents a great variety of conditions. This is an argument for the sanitarium, and that is one reason why patients in sanitaria, whether in one climate or another, do so well. It is that every movement and every meal is under the control and superintendence of competent men. Another thing, I consider such an experience as this recovery of a patient in New England an argument against sending patients away from New England. It is an encouragement to feel that a patient may recover in his own climate. But, other things being equal, it is better for him to lead an outdoor life and take his exercise in a land of sunshine and dryness rather than in one of wind and wet. Patients of very moderate means can take some such method of treatment much more satisfactorily than to go away and live in a miserable kind of way apart from home and friends. Other things being equal, I should say that this same course pursued in a more favorable climate would be attended with much more satisfactory results.

DR. VON RUCK, of Asheville: I would like to say some few words in regard to exercise. The question of exercise is, of course, a very important one. But I have

seen exercise pursued with so little regard to the condition of the patient that it has done a great deal of harm. The condition of the patient, the lung trouble, etc., must all be taken into consideration. I have seen patients free from fever take prolonged horseback rides and return with a temperature of 102° and 103°. I have in mind a case of a patient who lost his life by persistent outdoor exercise. This was a gentleman who consulted me with the view of entering my institution. He weighed 153 pounds, and had no acute signs. There was a slight family history of tuberculosis. His physician wrote him that he did not think he was sick enough to require the care of an institution, and advised him to take outdoor exercise. He lost not only what he had gained, but a number of pounds in addition by reason of outdoor exercise. He recovered from that, and began his outdoor exercise again, climbing mountains, etc., and started inflammatory processes in the other lung. This again yielded to the management of the local physician, after which he went down again, and then he thought he was sick enough to come to me again. He died some time afterward. I have no doubt this case, under favorable conditions, would have ended in recovery. This is not the only case. Out-of-door exercise and out-of-door life are two different things. It should be regulated, and every attention should be given to this exercise. I keep my patients outdoors about twelve hours a day, rain or shine.

Dr. Bowditch: The importance, when physicians in the East send their patients to the West, of sending them to some reputable physician cannot be overestimated. The Western physicians complain very naturally that we send our patients out there, and they feel better and climb up a high mountain and have a violent attack. We cannot be too careful on this point.

NOTES ON THE PREVALENCE OF DIPHTHERIA AT HIGH ALTITUDES.

By S. H. CHAPMAN, M.D.,
OF NEW HAVEN.

In August last, during an excursion to Franz-Josephshöhe—9500 feet high—into the heart of the great glacial region called Gross Glockner, in Eastern Austrian Tyrol, my guide related circumstances of an epidemic occurring during the early spring of the preceding year, in his native village of Heiligenblut, which aroused my curiosity.

On my return to the village of Heiligenblut, which is the starting-point of all excursions into that region of snow, I made inquiries of the factota of the village; of the hostess of the inn, who is the chief personage in all Tyrolean villages; the priest; and the telegraph operatress. Their statements verified and amplified those made by my guide.

Upon my return to Lienz, the nearest post and railway station, I called upon the only physician of the town; who, while being the only physician within a radius of thirty miles, is also the military surgeon in charge of the government hospital for the district of Lienz, and, therefore, a personage of authority and influence. He received me with great cordiality, and gave me an accurate description of his share in the epidemic, and as accurate statistics of the epidemic as was possible to one who had kept no special record of it. He enlarged the field of my search by describing outbreaks in Lienz proper and in a village called Windisch-Matrei. His statements as to the latter were also verified by the hostess of the inn at that place. These data, culled from various sources, I have briefly tran-

scribed, with such descriptions of localities and circumstances as may tend to illuminate the whole.

The architectural and ground plans of Tyrolean houses are the same; the size only varying according to the wealth of the proprietor. This general plan has been perpetuated for hundreds of years, having been found the best to fulfil certain absolutely necessary conditions of living in so rough a climate. A wide entrance hall, ending in a stone staircase leading to the sleeping-rooms above, paved with stone and roofed with heavy arches of stone, is effectually closed in winter by massive doors. The only entrance in winter is through a narrow door let into one of the great panels. On one side of this hall are two entrances, seldom closed by doors; one into the great stone kitchen and the other into the living room; the only rooms occupied except at night. On the other side of the hall is one entrance, always open, leading into a broad and deep stable. Here are kept the horses in summer, while the sheep, goats, and cattle are on the Alps, high up above the village. But with the first heavy fall of snow the cattle are driven down from the hills. The sheep and goats, horses and cows, pass through the narrow entrance, the huge doors are shut, and there they remain throughout the long winter.

The fluids and solids which naturally accumulate with rapidity, are, occasionally, transported, with some slight attempt at cleanliness, to a great stone pit enclosed by the walls of the house, but situated directly to the rear of the stable. Still the cattle stand fetlock deep in mire. The animal heat from so large a number is so great that the temperature in the stables stands steadily at that of June; finding an escape through the always-open door, the heated air warms the hall; mingling with the heat of the kitchen fires, it diffuses itself through the living-room, and escapes up the staircase to the sleeping-rooms above. An effective and economical steam-heating system.

Lienz, 3100 feet above the level of the sea, is a

town of a few thousands of inhabitants. It is situated on an extensive plain, surrounded by mountains. A swift-running river passes through it, into which all the drainage, which is altogether on the surface, runs.

Windisch-Matrei, 3700 feet, is a village of a few hundred inhabitants, situated on a spur of a great mountain, overlooking a deep valley. Mountain torrents rush through it; its single street is paved with cobbles.

Heiligenblut, over 5000 feet above the sea, hangs, like a swallow's nest, to the side of a precipitous incline, hundreds of feet above the brawling stream of ice-cold water fed by the great glaciers four thousand feet still higher. The stones of its single narrow and tortuous street are washed by the constant overflow of a torrent which rushes past to meet the stream in the gorge below. The scenery is forbidding. The surface of the ground seems stone, polished smooth by the storms, and glistening dry under the noonday sun.

Heiligenblut has about half the population of Windisch-Matrei. From June to October a telegraph station is located here. For the rest of the year the post-wagon twice a week, except when winter's snows have covered the roads deep; then communication with the outside world entirely ceases, except for some random visitor whom the Government makes its temporary postman. For six weeks, at least, previous to the outbreak of diphtheria, all witnesses alike testified that Heiligenblut had been entirely isolated.

During the summer the journey from Lienz takes more than twelve hours, so that travellers are accustomed to halt over night. For half the distance the road is too narrow for the ordinary carriage, and so steep and dangerous that one prefers to trust to feet rather than wheels. The road to Windisch-Matrei is, however, a good post-road, and by no means so long or hard. Winter closes upon Heiligenblut in September, and does not let go its hold before the

middle of May. In fact, throughout the summer, in sheltered nooks on a level with the village, there are still reminders of winter's severity in the shape of banks of snow.

Early in February, 1887, the only child of the richest peasant of the valley, a boy of ten, sickened and died in three days. The symptoms, as related by the peasant, were grim in their simplicity: "The lad was well; all at once he couldn't swallow; his neck was swollen, and his throat very sore; then suddenly he died." There were no other cases of illness until after the first of March—not such a March as we ordinarily have, but a March of blizzards, of Arctic cold and of snow six to eight feet deep on a level. Then, simultaneously, many children were attacked, and died.

At the end of a week of the "plague," as the peasants called it, notwithstanding the danger attending the journey, a messenger was dispatched for the doctor, who, after a toilsome journey of two days, reached the village. The physician pronounced the disease diphtheria of a virulent type. His treatment consisted of insufflation of sulphur, and poultices to the neck.

His treatment was so unsuccessful that the peasants had recourse to charms, prayers in the church night and day, and to the aid of an aged peasant—a kind of oracle in the village—whose treatment, the peasants averred, saved more lives than did that of the doctor. It consisted of an ointment of sweet cream and powdered gunpowder.

The physician's statistics were—sixty cases, forty-eight deaths. By the end of March the disease had disappeared. The disease was entirely unknown to the oldest inhabitant. The description of the disease by the physician was somewhat meagre—he adding, to the account by the peasant who lost his son, only these facts: The crisis was reached in from two to three days; besides the swelling of the glands and inflammation of the throat, there was often severe

hemorrhage from the nose preceding collapse. There was no attempt made to isolate cases.

Early in April—carried in the clothing of a victim of the outbreak—the disease appeared in Windisch-Matrei. This bundle of clothing was taken over the mountain direct to the latter village, by a route that makes one of the most delightful excursions in summer. But the virulence of the poison had become much attenuated—to such a degree that ten cases only occurred, and of these, six died.

From Windisch-Matrei the disease was caried down the valley to Lienz, appearing there in the latter part of April. The statistics of its outbreak there, however, are too obscure to be relied upon, the evidence going to show that but few cases occurred, and that the mortality was less than half.

The physician considered the disease atmospheric, non-contagious, and uninfluenced by treatment of any sort. As an illustration of his theory, he related the following case: In a family of nine children of poor people, occupying two or three rooms only, two children under ten were simultaneously attacked. Treatment was—nothing. One recovered, the other died, and the remaining seven escaped the disease altogether, notwithstanding that the cases were not isolated.

I have ventured to relate these incidents, perhaps less concisely than was necessary, because of the interest attaching to the question of the development of diphtheria at so high and isolated a spot. It seems possible, from the foregoing data, to draw the following conclusions:

That the latent germ was stimulated into active development in the steaming, fermenting, fevered atmosphere of the stable.

That its virulence was rather increased than diminished by the high altitude and by the rarity and low temperature of the air.

That propagation from house to house was not hindered by the passage of the germ through a rarefied air of very low temperature.

That the impulse of the germ became less and less violent as time elapsed after its first appearance.

That the history of this epidemic seems to show that there took place a special culture of the specific microbe, in definite quantity; that all the cases were attacked by the originally developed microbe; but that, under the wearing action of time and atmospheric conditions, its virulence became more and more attenuated until it again passed into a harmless period of existence or became scattered in localities unpropitious for further development.

THE MINERAL SPRINGS OF COLORADO.

By CHARLES DENISON, M.D.,
OF DENVER, COLORADO.

Among the various natural advantages to be found within the borders of the Centennial State, few if any are greater and more wonderful than the mineral, cold, and thermal springs. This richness is not astonishing to one who is conversant with the remarkable geology of this section. The ore "belts" and ore "shutes," showing different combinations of the precious or base metals—here the salines, there the sulphurets, or again the chlorides, carbonates, or chalybeates predominating (and sometimes all of them existing together)—are but indices of the processes which in the Rocky Mountains have produced a great variety of medicinal waters through igneous, electrical, or other natural means.

The "carbonates" of Leadville, the sulphurets of the San Juan region or of Clear Creek County, or the chlorides of Custer County, show a marked similarity in their combinations to the neighboring mineral springs. It is claimed that the famous Bassick and Bull Domingo mines in the Wet Mountain valley are but the remains of tremendous thermal springs, where boulders were coated with metals and salts, and the surrounding rocks also became impregnated for considerable distances. And there are many miners who believe the great mother spring or volcano will yet be found which once threw up that large chloride deposit extending over miles in area near Silver Cliff.

The task of describing all the mineral waters of Colorado is impossible at this early stage of Colo-

rado's development, as the data are yet too crude and incomplete.

The thirty-three analyses of separate mineral flows, included in the five tables here presented, though perhaps imperfect, are about all those that have been made of over ten times as many mineral springs in Colorado.

However, the chronicler of a few years hence will have a great advantage, when the complete analyses of Colorado mineral waters, authorized by the last State legislature, shall have been completed.

The writer takes pleasure in referring to Dr. Solly's published description of the "Manitou" mineral waters, and at the same time feels compelled to pass by the wonderful Pagosa, Ouray, Uncompaghre, Tomichi, Wagon Wheel Gap, Canon City, Poncha, Cottonwood, and the hot springs of Middle Park. He will confine himself to a description of four of the groups, chiefly in northern Colorado, which he has personally investigated, namely, Steamboat Springs, the Siloam and Glenwood Springs group, the Seltzer at Springdale, and the thermal waters at Idaho Springs; adding a description of the latter point as a representative mountain health station. However, the other analyses, included in the accompanying tables, will serve for comparison and give an idea of the variety there is, as all the analyses are reduced to a like standard, namely, parts of mineral or solid substances in 100,000.

These analyses are grouped, without any claim of excellence for the classification, under the five following heads:

1. Alkaline.
2. Saline.
3. Sulphur waters.
4. Chalybeate.
5. Artesian wells and unclassified springs.

Steamboat Springs, *Routte County.*

One of the most wonderful collections of mineral springs in America is to be found in northwestern

Colorado, west of the main range of the Rocky Mountains; along both banks of the Bear, or Indian Yampa River, and above the point where the Elk River joins it from the north.

The town is in its infancy, and the springs are named Steamboat because of the likeness of one of them to the puffing of a steamboat, with its peculiar rumbling, swishing, and hissing noise. This spring, although cold, is so freighted with gases that a regular spouting to the height of about three feet is caused through a hole ten inches in diameter in the solid rock. (For the analysis of this spring see Table II., fifth column, of the accompanying Analyses of Colorado Mineral Waters.)

The remarkable fertility of this neighborhood in variety of mineral waters is instanced by the fact that within forty feet of this gas spring there are three flows of water which give different colored deposits on the grass and stones over which they flow.

There are forty or fifty springs in all, on either side of a limestone and quartzite ridge, running northwest and southeast, the valley of the Bear at this point running east and west.

The springs are at present reached by stage, about 100 miles south from Rawlins, Wyoming, on the U. P. R. R.; 75 miles north from Russell, on the D. & R. G. R. R., and 85 miles northwest from Hot Sulphur Springs, in Middle Park, Colorado, which is 48 miles from Georgetown, on the Colorado Central R. R. The latter route, about 180 miles from Denver, has been the one usually chosen by tourists, but the Russell route just opened is shorter.

It is only a question of time when some enterprising railroad corporation will extend the iron rails into this valley of the Bear River. There are inducements sufficient in the coal, iron, and grazing advantages, not to mention one of the most attractive—to the genuine sportsman—summer resorts in the United States; for here, according to the

writer's experience, one can catch more trout in an hour, and find larger game in hunting, than in any other portion of Colorado. For instance, during a half day's hunt in "85" after a bear and elk, the latter of which he shot, he saw seventeen deer and three elk, in bunches numbering from one to three, just west of the Elk River. Of course the numbers are gradually decreasing, but the region is peculiarly adapted for the grazing and haunts of game, as well as for hunting on horseback. The mountains are not abrupt as in the main range, but rise by easy gradations from the beds of the streams to a distance of from three to eight miles away. These hills and valleys in summer are covered with rich grass, which the fortunate possessors of the bottom-lands use as pastures, while they cut hay from their ranches to tide over the two or three months of winter, with the deep snow which is characteristic of the upper half of the Bear River valley.

The altitude of the springs is about 6500 feet above sea level, and it is somewhat colder than the same elevation on the eastern slope of the Rocky Mountains. The air is decidedly bracing and very dry, and invalids generally have been known to become robust and healthy by a more or less prolonged stay in this section. It should of course be noted here, that only those most fit for such a life of "roughing it" have thus far gone into the Bear River valley. The springs have been taken up by individuals and are included in the domain of the Steamboat Town Company.

Among the mineral springs, there is one of which it is especially delightful to drink. This is the *Iron Spring*. The water is cold and contains carbonic acid in excess, as well as the iron; so that, while drinking, it tastes much as does freshly drawn Vichy, and more of it can be imbibed at one time than can be done with any other water with which the writer is acquainted. (See cccompanying Table IV., first column, for analysis.) Besides being one of the best

chalybeate waters known, this has been found especially efficacious in dyspepsia.

About half a mile from the main group of springs is the *Bath Spring*. This is a hot spring—temperature 103° F.—which bubbles up in a pool twelve feet in diameter. A bath in this spring is peculiarly delightful, probably in part because of some chemical combination on the surface of the bather's body, which is covered, while in the water, with minute white bubbles. (The analysis of this water is found in Table V., third column.)

There are two other hot springs in this vicinity, one of which, with a large flow of water, is situated about five miles north of Steamboat Springs proper, and has a temperature of 156° F. This water, and that of several other important members of the group, have not yet been analyzed.

There are two or three cold boiling springs, with large flows of water, decidedly sulphurous in nature.

Then there are various combinations of iron with sulphur. One spring boiling up in a pool thirty feet in diameter, is called the "Milk Spring" because the water is white as milk. This water has a sweetish, salty taste, and cattle seem to like to drink of it. There are two or three other springs which are probably also composed of magnesia, either alone or in combination with iron, as a principal constituent. One of the springs is decidedly saline, the water proving actively purgative if taken in sufficient quantities.

There are pools of mineral water not yet investigated and a cave formed by the deposit from mineral water. This excavation is so filled with gases that one's lungs immediately become exhausted if he tries to remain there.

Besides all this, there is plenty of good drinking-water not mineralized; all of which goes to show that Steamboat Springs, because of its natural advantages, is destined to become a very attractive resort for the tourist and invalid, especially in the summer time.

The analyses of the waters were made by Prof. E. J. Mallett, Jr., formerly of the School of Mines, at Golden, Colorado.

Siloam Springs, *Garfield County.*

These springs consist of five outflows along the banks of the Grand River, below where the Eagle River empties into that noble stream, and just west of the boundary line of Eagle County. The elevation is about 6000 feet above sea level and they are warm, or hot, being from 94 to 104 or more degrees Fahr., and contain a combination of salines very similar to the waters found at Saratoga.

According to Sir Henry Thompson, the heat intensifies the effect of the medicinal ingredients which such waters contain. This is undoubtedly the fact, for a single glass of this water taken hot is a purgative under ordinary circumstances. This does not appear to be otherwise explained according to the partial analysis of the Bath or Warm Sodium Spring, by Prof. Regis Chauvanet, of the Colorado State School of Mines, unless the effect mentioned be due to the sulphate of lime. (See Table II., second column, for analysis.)

A much larger flow of water has been developed since this analysis was made—*i. e.*, in the Cave Spring, nearer the head of the Canon of the Grand, about half a mile further down the river than the warm Sodium Spring.

The tunnel or entrance to the cave is about five feet wide, and the flow of water which reaches across the bottom is six inches or more deep, the temperature being about 103° F. This cave is constantly full of warm steam, and the hot water pours from the porous rock by many openings, as in the caves at Glenwood Springs, sixteen miles further down the Grand River.[1]

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[1] At the entrance to this cave a substantial bath house and across the river the first hotel of Siloam have just been completed.

There is, in other respects, much similarity between these outflows and those at Glenwood.

On the opposite side of the river from the Cave Spring, between an island and the main land, is "The Pool," which gives the town its name of Siloam, after the spring and pool made memorable in Bishop Heber's lines, "By cool Siloam's shady rill," etc. This pool is over one hundred feet in diameter, with mud banks formed largely of the chemical deposits from the large flow of hot mineral water which comes up in its centre. Neither the waters of the Pool, the Cave Springs, nor of the Boiling Spring, further down the river, have yet been analyzed, but they are heavily mineralized, and the latter especially is said to be agreeable though peculiar in taste, and to have a decided effect upon the action of the kidneys as well as upon the bowels. Though the total flow from Siloam's five principal springs is less than that at Glenwood, yet it is approximated by a good judge to be over ten thousand gallons an hour.

The analysis already given shows a remarkable similarity to the Saratoga group, especially the Eureka, while the total constituents are like the Empire and Congress flows. As alterative, laxative, and diuretic waters, these alkaline saline springs are destined to take a prominent place among the medicinal springs of America. It is the intention of the promoters of the town to improve the springs by adding bathing establishments, and hopes are entertained of having a Sanitarium of considerable proportions built at this point. The Denver and Rio Grande Railroad is completed through the town, and some considerable work has already been done on the opposite side of the river, on the joint roadbed of the Burlington and Union Pacific railroads.

The beautiful valley, in the centre of which are the hot springs, and around which rise magnificent mountains, one above another, till a height of 10,000 to 14,000 feet above sea level is reached, affords many advantages for a health resort.

Among the natural attractions near by are the

wonderful Canon of the Grand River, equal in grandeur and sublimity of views to any of Colorado's gorges, and the "Deep Creek" Canon, three miles northeast, crossed by the road leading to "Sweet Water Lake," twelve miles distant. This lake is a most charming body of clear water in which, as well as in all the streams mentioned in this article, are quantities of trout, which can be taken in large numbers by a good fisherman at the right season of the year. Near this lake are some interesting caves. Around these places—*i. e.*, up in the mountains near "timber line"—a persevering hunter will undoubtedly be rewarded by coming across a deer or antelope, and occasionally a bear, though the chances are more than even that he will say he "has not lost any bear" should he meet a member of the bruin family.

About nine miles from Siloam to the north, and at an elevation of 9000 feet above sea level, is an area uncovered by snow in the coldest winter, where a cloud of steam exudes from the earth. This is supposed by some to be an escape of gas and steam from the source of the hot springs at Glenwood and Siloam.

In other ways this region about Siloam is wonderful and interesting, not to omit the utility of unlimited amounts of gypsum, limestone, granite, marble, lumber, coal, and carbonate veins containing silver.

The Seltzer Springs.

These springs are situated at Springdale, Boulder County, a small mining hamlet, ten miles from Boulder, the county seat, which is the nearest railroad point. There is a post-office and daily mail. Stage leaving Boulder at 1 P.M. daily, also reached by daily stage from Lyons, about the same distance away, on the line of the Denver, Utah & Pacific Railroad. The location is on James Creek, a clear mountain stream, surrounded by wooded mountains, and in the midst of picturesque scenery. Trails and

foot-paths lead to the summit of lofty peaks in the vicinity, from which can be had grand views of the snowy range eight to ten miles distant. These points also command sweeping views of the plains to the north, south, and east, spread out like a vast ocean. The subjoined analysis (see also accompanying Table IV., third column) of the Seltzer Springs by Dr. Jackson, State Assayer of Massachuetts, indicates their value:

Contents per imperial gallon 10 pounds by weight.	Grains.
Sulphate of soda	129.12
Carbonate of lime—bicarbonate in the water	52.00
Chloride of sodium	5.96
Iodide and bromide of sodium	1.56
Bicarbonate of soda	6.56
Bicarbonate of iron	4.80
Bicarbonate of magnesia	0.80
Silicate of soda in the water	4.80
Weight of contents of one gallon	205.60

The formation of the springs is in solid granite. The water flows freely out of the crevices of the rock and is strongly impregnated with carbonic acid gas.

The springs are situated near the edge of the creek. The drinking-water, separate from the mineral spring, is pure and soft and is obtained from wells. The baths are used extensively, with excellent results, in chronic rheumatism, the water being heated artificially.

The climate differs only from the "valley," or plains, in the cooler nights in summer. The mean temperature is slightly below that of Denver—about 47° for the annual average. The attractions of the neighborhood are the mining camps and mines in the immediate vicinity, the walks and rides in all directions presenting varied and picturesque views, and the trout-fishing in the St. Vrain, a few miles distant.

The springs were discovered in the early history

of the Territory, and the waters have been used by those living in the vicinity ever since.

There is a small but well-appointed hotel, and several cottages connected, where every convenience and comfort can be had at moderate prices.

The flow of water from the principal spring is about the capacity of a one-inch pipe, with, say, one foot of pressure. The soil is light and gravelly, and there are no stagnant pools, as the swift-running creek supplies a channel for quickly draining off all refuse.

When the analysis is compared with those of the celebrated springs elsewhere (reduced to a uniform standard—*i. e.*, parts in 100,000 of water), its place is well established among such springs as Bethesda, Waukesha; Hot Springs, Arkansas; and Old Source, St. Moritz, Switzerland; Gastein, Austria; Seltzer, Saratoga. The Bethesda, with one-seventh as much salt—solid ingredients—as the Springdale water, must get its superior value, if it has any, from substances the analysis does not mention. We would be inclined to offer the same excuse for the waters of the Hot Springs, Arkansas, and the Gastein, in Austria, except for their silica, if it were not for their great heat, which, being natural, is believed to be much more advantageous. The Springdale Seltzer analysis, as a measure of valuable chemicals, seems to be superior, especially in quantity, to all those named, which it decidedly resembles. But the closest analogy is to the waters of the Seltzer Springs, Saratoga, and the Old Source spring, at St. Moritz, Switzerland. The Springdale Seltzer, though weaker than the Saratoga Seltzer in salines, is stronger in iron, which is in the excellent form of the bicarbonate. It resembles the St. Moritz, Switzerland, except that it has six times as much sulphate of soda. The additional alterative influence of the silicate of soda and of the iodide and bromide of sodium, which the Springdale water contains, would place it above both the other two mentioned. It is a decided tonic and alterative water. It is alkaline and slightly diu-

retic, effervescent and agreeable, and is indicated in dyspepsia chiefly, in convalescence from fevers and debilitating diseases, in chlorotic disorders and in anæmic states where iron is needed. The beneficial effects in case of diabetes and in other chronic diseases of the kidneys have been noted by the writer.

Idaho Springs.

Idaho Springs is one of Colorado's promising mountain towns. It owes its prosperity to the hot medicinal springs which are found there, and after which the town is named; to the climate and natural attractions of the locality, and to the gold and silver mines in the mountains near by. It is thirty-five miles distant from Denver and reached in two hours on the Colorado Central, a narrow-gauge branch of the Union Pacific Railroad, and its elevation above sea level is 7512 feet at the railway station. From the plains, two thousand feet below, up to this point, most of the Clear Creek canon, through which the railroad mounts to this elevation, is a closely shut-in winding gorge whose precipitous sides furnish a variety of scenery; a constant and pleasurable wonder to one who first makes the journey. Near Idaho Springs, however, the canon widens out into a valley over a mile long, in the centre of which lies the town, a very pretty place as seen from the low hills on the south. It is a clean, well-arranged city of about two thousand inhabitants and five hundred houses, built along the north and south banks of a small stream—the South Clerk Creek.

To the north of the valley, which here runs east and west, the mountains rise more abruptly and higher—thus protecting the town from inclement north winds—while the less precipitous mountains to the south allow a desirable long continuance of sun exposure.

The three hotels of the town, together with a restaurant and several boarding-houses, have entertained an average of about five hundred strangers

during the summer months, not to mention many tourist parties which have come up from Denver just for a day's trip. This fact, together with the record of about a thousand baths given at the bath establishment at the springs during the past summer, gives a good idea of the summer popularity of this resort. There is no reason why this record should not extend through the remainder of the year and be trebled during the summer time, when the contemplated improvements of the springs and baths, and suitably attractive hotel accommodations for invalids in winter, are completed.

Those who have the requisite vigor and endurance to accomplish the same, can plan walking, fishing, and sight-seeing excursions, which, with the baths and improvised or occasional amusements in town, may help to while away a considerable sojourn in this delightful locality and bracing climate.

There is quite a climb possible—and from the name given to the mountain it would seem to have been enjoyable to some—to the top of Flirtation Peak, south of the town. It is about a thousand feet above the railroad and makes a delightful walk for those who are well able to accomplish it. It is a kind of exercise that would furnish convincing proof to those practising it daily that there could be no danger of the collapsing of lung tissue, to which feeble-chested people are liable.

Walks in different directions to either lower or greater heights are possible, and there is no lack of opportunity to practise the treatment of consumption by hill-climbing, so much esteemed by some German physicians.

From the south, two streams—Chicago and Soda creeks—empty into Clear Creek, and the valleys or "gulches" through which these streams flow, also the canon above and below town, may be explored. One who has the curiosity and strength may tax them both to his heart's content in climbing far up on the mountain sides to the shafts of the many mines at the north of the town, where he can descend, if

he chooses, a thousand or more feet into the bowels of the earth.

The livery advantages are ample and the charges for carriages or horses are reasonable. Many places can only be reached by trails on horseback, a means of travel that is not elsewhere more enjoyable or invigorating. One can visit the following places of interest by carriage or in any way which better suits his fancy:

Bellevue Mountain, five miles distant on the stage road to Central City through Virginia Canon, a point from which to get a fine view of mountain tops and fields of snow; Green Lake, fourteen miles away and beyond Georgetown, is a very delightful spot to visit, as is also the Chicago Lakes, twelve miles to the south, and Echo Lakes, eight miles to the southwest.

The Chicago Lakes are claimed to be the highest of any bodies of water upon this continent. They are beautiful sheets of clear water in which are numberless trout to tempt any one who is an adept with the rod and the fly. The rocks and gorges around these lakes are remembered for their grandeur and sublimity. It was here that the great artist Bierstadt camped and gained the inspiration from actual experience for his famous picture "The Storm in the Rockies." Part of the journey to these lakes has to be made in the saddle by a regular mountain trail. However, the hardship, if such it be, of this journey is well repaid by the new experiences enjoyed and the delightful views obtained.

Chief Mountain, 12,300 feet above sea level, on the south, is visited by adventurous climbers; Bear Creek, also on the south and nine miles distant, is sometimes visited by the lover of trout fishing. However, to reach the best fishing and hunting from this centre, one must take several days and go over the mountain range into Middle Park, where there are many streams and the beautiful Grand Lake well supplied with trout waiting to be tempted with the artificial fly—and many will continue to wait if past experience will count for anything.

It is possible to accomplish many of these walks and drives in winter, but for additional amusement there is ample opportunity for those who will build a sanatarium hotel here, to construct skating ponds and toboggan slides in the town, in imitation of the Swiss resorts; as at Davos, where for several months consumptives spend the winter above the line of continual snow. The main difference, however, would be that at Idaho Springs such natural means of coasting would exist but for a short period, as the snow-storms are light and evanescent, and artificial contrivances would have to be substituted.

Besides an Athletic Association and periodical "hops" at the hotel, there are in the town literary and social societies, and a small opera house where the troupes, which visit the mountain towns, help to entertain the inhabitants with evening amusements.

The Mineral Springs.

The discovery of the *Hot Springs* at Idaho was made in a curious way. There is quite an area of ground near the mouth of Soda Creek where a well sunk ten or twenty feet will reach hot mineral water. In 1859, in the days of the gold excitement, a miner, James Jack, "struck" hot water in a prospect hole, which was afterward enlarged and used as a bathing pool by gulch miners, prospectors, and adventurers. Afterward, other sources and other kinds of water were discovered near by, but the popularity which these springs have acquired for medicinal virtues is due chiefly to two of the flows, viz.: the warm iron and soda spring, which is called the "Drinking Spring," and the Bath Spring, which is principally used for bathing purposes.

Apart from the main group, and below where Soda Creek empties into Clear Creek, is a cold saline spring, which Dr. Brummond says he has often prescribed for constipation with excellent results, the patients taking two goblets of the water, which is quite palatable, before breakfast and in the

evening. There has been no analysis of the water of this last-mentioned spring.

It is estimated that all the hot water flowing from the different sources in the main group, if conducted into a trough a foot wide, would make a stream a foot deep moving as fast as a man walks. This gives an idea of the abundance of the flow. There is evidently hot water enough were it properly collected; and could it be done, the writer suspects other varieties would be discovered. Much as at Steamboat Springs, Colorado, where there is a great variety of mineral water, there seems to be at Idaho Springs a change in the geological formation of the mountain—a vein or ledge breaking out, by means of which these hot currents reach the surface from nature's labyrinth deep down in the earth.

The largest of these flows is from "The Well," which has been sunk twenty-five feet below the surface, and out of which the water is pumped in summer for use in one of the three bathing-houses there. The temperature of this water is 110° F. Another large flow is from the Bath Spring, used at present in the lower and newest of the bath-houses. The analysis of this, made by Dr. I. G. Pohle, of New York—that is, *grains* in a gallon—is here given. The temperature is from 103° to 110° F. as the water flows into the bath.

ANALYSIS.

	Grains.
Carbonate of soda	30.80
Carbonate of lime	9.52
Carbonate of magnesia	2.88
Carbonate of iron	4.12
Sulphate of soda	29 36
Sulphate of magnesia	18.72
Sulphate of lime	3.44
Chloride of sodium	4.16
Chlorides of calcium and magnesium, of each	a trace
Silicate of soda	4.00
Total	107.00

In the accompanying tables (see second column of Table IV.) the analysis is changed to parts in 100,000, for the purpose of comparison with the other mineral waters given.

There is another source near by from which similar water is obtained, but of a higher temperature, 120° F.

Further up the gulch and to the left is the *Drinking Spring*, which is an alkaline chalybeate water of evident value. The deposit from the water, as it flows away from a pool beside a rock and becomes colder, looks like the bicarbonate of iron, which must exist in unusual proportion. The gas that bubbles up with the water is probably carbonic acid, and the temperature of this water is 85° to 90° F. This water is much used for drinking, and has acquired considerable reputation for the relief of dyspepsia and for its salutary action on the kidneys.

Further up the valley and to the left, still more wonderful phases of this mineral spring formation remain to be described. These are the *Cave* and the *Tunnel Springs*. The former is a warm pool—temp. 100° F.—at the bottom of a considerable excavation in the rock which forms the mountain side. A little house is built close to the entrance of the cave, where the bather can gradually cool off after the bath.

The Tunnel Spring is more remarkable. Here is an excavation directly into the rock at the base of the mountain to the extent of fifty or sixty feet in length, and eight feet wide and high. Partitions are built across this tunnel at twenty and forty feet and at the entrance. In the inner room a bathing pool is constructed large enough for one or two persons. There is quite a large flow of water through this basin, and its temperature is 105° to 110° F. The inner room is filled with an atmosphere about as hot as the water, and also saturated with medicinal vapors. Under these peculiar conditions we have a good imitation of the old Russian bath. The relaxation and cutaneous perspiration

possible in this natural steam-vault can be carried to any desired extent, and much caution is needed in again returning to the outside atmosphere. A cold plunge or shower-bath after such treatment would act as an excellent preventive of "taking cold," by closing the pores and fortifying the skin against the sudden change of temperature in coming out of the tunnel.

While on the subject of water one should not forget to mention the abundance of pure water that supplies the town. It is taken from a reservoir on the hill to the south of the town, to which it is conveyed, by ditch and flume, from the original springs further up in the mountains.

The opinions of the local physicians as to the curative virtues of the medicinal water should be valuable in this connection. Dr. P. Brummond, as already stated, has often prescribed the lower spring water for constipation. He has also found good results from the use of the "drinking," or iron-soda water, in dyspepsia and in kidney disease (gravel), and in cystitis. The "hot tunnel" baths he has prescribed in conjunction with the internal use of salicylic acid or iodide of potassium for rheumatism, and been much pleased with the effect. He has noted good results likewise from the use of the "Bath" spring water for eczema, taken internally as well as used by bathing.

Dr. William B. Hawkins, another resident physician, has kindly furnished the following notes of three patients who have used the waters, and his evidence seems to agree with what we would expect to result from their judicious use in gouty and rheumatic affections:

Case I.—Mr. A. D., a resident of this place, thirty-seven years of age, inclined to stoutness and possessed of a gouty disposition and heredity, came to me in March, 1888, suffering from the usual symptoms of lithiasis or latent gout. In addition to remedies addressed to his digestive disturbances, I advised the systematic use of the alkaline mineral water internally, in conjunction with frequent alkaline baths (natural hot spring

water). All the symptoms were promptly relieved, and though he had been long subject to similar attacks, none has occurred now for nearly a year, the mineral water having been continued quite regularly.

CASE II.—Mr. G. M. B., of St. Louis, came here in June, 1888, suffering from subacute rheumatism in both ankle-joints, which rendered locomotion very difficult, painful, and almost impossible. After three or four weeks' use of the hot baths, and the mineral water internally, he returned home greatly improved, being able to walk without the slightest difficulty.

CASE III.—Mr. A. D. J. came here in July, 1888, from Nebraska, a great sufferer from chronic rheumatism, nearly every joint in his body being more or less affected. He "camped out" in the neighborhood of the springs, relying exclusively upon the internal and external use of the alkaline water, and after a residence of about two months went away almost entirely relieved of all his disabling and painful joint symptoms.

In addition to the above-described cases, there are many people at present residents here who enthusiastically ascribe their nearly complete immunity from the recurrent attacks of rheumatism to which formerly they were subject, to the regular use of our alkaline water.

Mr. Montague, the present owner of the hot springs, has seen several cases of periodical gout relieved in those who have come up to take a course of baths and to drink the water. Of course, the absence from convivial scenes and from over-indulgence, together with the exceedingly bracing atmosphere, are valuable aids to the mineral water in the relief of these cases.

However, the statement as to the cure of gout emphasizes a marked correspondence between Pohle's analysis of the Bath Spring water and that of the "Sprudel," at Carlsbad, in Bohemia, the fame of which for use in gout and kindred affections has become world-wide. The only essential differences between these two flows appear to be that the Carlsbad is hotter (169.5° F.) and that it has a stronger element of soda, while Idaho Springs has a very much greater proportion of iron. As compared with the Carlsbad, the Idaho Springs water is less saline and purgative, but more tonic. It is undoubtedly a

very valuable alkaline, saline, alterative, and tonic water.

The ingredients naturally dissolved far down in the earth's hot laboratory—according to the distinguished authority, Sir Henry Thompson—may be expected, when taken in their natural state and temperature, to have four times the beneficial effect that the said chemicals would have, taken from the shelves of a drug-store.

Like Carlsbad, these waters should, and undoubtedly will, gain a reputation for the relief of diabetes, and of gastric catarrh, either alone or associated with disease of the liver. Prof. von Niemeyer especially recommended the Carlsbad waters for gastric catarrh. The writer would recommend the use of the Idaho Springs water for a very common condition, hyperæmia or engorgement of the liver, whether it be active or passive, with the suggestion that should drinking the water not prove laxative enough then in addition a hot sour lemonade be taken on retiring at night or rising in the morning. This plan, with the proper diet and the climbing of hills during the daytime, would be very likely to bring a rebellious liver "to terms." If it did not, and the patient continued to have too constipated bowels, the addition of a teaspoonful of Glauber's salts to the early morning draught might be efficacious. This last addition would make the water as strong or stronger than the Carlsbad.

Looking for other correspondences among the noted springs abroad, we see a marked similarity between the Idaho Springs water and the Marienbad, situated in Bohemia, twenty-two miles south of Carlsbad. This, however, is a cold spring and very purgative. Otherwise the correspondence between the Idaho and Marienbad is even more marked, because of their chalybeate qualities, than between Idaho and Carlsbad springs.

Of the Marienbad waters a distinguished authority on mineral waters has said, what has also been claimed for the Idaho Springs water, that beside

an increase in the excretion of urine, "the secretions of the mucous membranes are increased and perspiration is more free. The appetite and digestion usually improve under their use, and, owing to the presence of carbonic acid and iron, the prolonged use of the water does not prove as debilitating as otherwise would be anticipated."[1]

In the chalybeate qualities there are still more remarkable correspondences between the Idaho and the celebrated St. Moritz Springs in Switzerland.

The writer, when visiting the Maloya Valley, Switzerland, in the summer of '88, was surprised at the reputation the St. Moritz flow had acquired, considering the remarkable simplicity of the analysis (total ingredients, ten grains to the pint—*i. e.*, aside from the carbonate of iron contained). These springs have become the attractive centre of large hotels, where thousands yearly linger to drink the tonic waters. Maybe an American should not allow his wonder to be too demonstrative, because the Arkansas Hot Springs, with one-tenth as much mineral ingredients, have become quite as celebrated, and even the pure water of Waukesha has a continental reputation.

However, the St. Moritz is one of the best of Dr. Walton's group of foreign chalybeate waters—the Schwalbach and Pyrmont, in Germany, the Spa in Belgium, and the St. Moritz, in Switzerland. Nevertheless, the Idaho Springs contain three times as much carbonate of iron, and nearly three times as much carbonate and sulphate of soda as the St. Moritz flow, which latter has also the disadvantage of being a cold spring (49° F.).

The use, therefore, of the "Drinking Spring" water at Idaho Springs for anæmic conditions, chlorosis and convalescence from diseases attended with impoverished blood-states, will naturally be suggested to every medical mind.

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[1] The Mineral Springs of the United States and Canada, etc. By George E. Walton, M.D. D. Appleton & Co., N. Y.

It will not be difficult for a physician to select a typical case that would be benefited by drinking this spring water, especially in such a bracing climate a mile and a third above sea level. In the opinion of the writer, a typical case would be a chlorotic young woman—probably with constipation and amenorrhœa, deficient muscular tone and lung capacity, feeble assimilation and languid nerves, with or without some gastric catarrh. How often the busy practitioner sees such a case, and wishes the needed iron could be so combined as to relieve and not increase the accompanying constipation. In the Idaho Springs iron water nature has accomplished the desired combination in the sulphate of soda present. The surrounding conditions are also best calculated to give renewed circulation of blood and vigor of muscle.

This water is chalybeate without being constipating; laxative without being depressing; alkaline, yet with an excess of carbonic acid; hot, yet agreeable to the taste.

In the "drinking" spring is almost an exact imitation of the celebrated Apollinaris Water, with the carbonate of iron, the silicate of soda, and a little sulphate of magnesia added It can be taken with greater impunity than many simpler waters, because of its peculiar combination, the main effect to guard against being a tendency to congestion of the head from the excessive amount of iron.

If acid dyspepsia, with chronic catarrh of the stomach, is not relieved by its internal use, the addition of a little common salt to that which is drunk after meals may be serviceable.

As a bath the use of the hottest spring water can be recommended for chronic rheumatic swellings, the swelling or stiffness of joints, plethoric or impure blood conditions, especially if associated with any eczemas or chronic skin diseases. Besides, in certain chronic diseases peculiar to women, the local use of the hot water at the bath would be invaluable—such as for leucorrhœa, subinvolution, or chronic uterine inflammations.

TABLES I. TO V., SHOWING ANALYSES OF COLORADO MINERAL WATERS.

I.—Alkaline (Calcic or Purgative).

In 100,000 parts of Spring Water are contained :	Iron Duke, Canon City. (Prof. Leon, of Wheeler Expedition)	Hot Spring, Canon City. (Prof. Leon.) 104° F.	Shoshone, Manitou. (Wheeler Expedition.) 49° F.	Parnassus, near Pueblo. (Wheeler Expedition.) 72° F.	Navajoe, Manitou, (Wheeler Expedition.) 50° F.	Liberty Spring No. 3. Wagon Wheel Gap. (Wheeler Expedition.) 140° F.
Carbonate of soda	131.69	125.51	88.80	118.45	134.69	144.50
Carbonate of lithia	trace	trace	trace	1.78	0.25	trace
Carbonate of lime	56.58	56 07	108 50	54.54	129.40	22.42
Carbonate of magnesia	25.03	21.95	.....	22.43	31.60	
Carbonate of iron	trace	.....	.....	2.23		
Sulphate of potassa	.....	.....	5 12	18.44	16.21	trace
Sulphate of soda	20.92	135.97	37.08	3.98	18.42	13.76
Chloride of sodium	142.32	31.07	42.12	53.23	39.78	33.34
Silica	.....	.....	trace	6.00	1.47	4.75
Organic matter	.....	.....	.....	.....	.....	trace
Total	376.54	370.57	281.62	333.92	361.60	218.77
Gases	.....	.....	Car. ac.	Car. ac. Sul. hy.	Car. ac.	

II.—Saline Springs.

In 100,000 parts of Spring Water are contained.	Boulder Spring water (Prof. J. A. Sewall, State University.) Cold.	"Siloam Springs," "Bath Spring." (Prof. Regis Chauvanet, Colo. School of Mines.) 103° F.	"Yampa Spring," Glenwood. (Chas. F. Chandler, Ph.D., New York.) 124 2° F.	"Unnamed Spring," Glenwood (Chas. F. Chandler, Ph.D., New York.) 124.2° F.	"Steamboat Spring." Steamboat Springs. (State Sch'l of Mines.) (The Gas Spring.) Cool.	South Park Springs. (Prof. G. E. Patrick, Kansas University, Kansas.)	Carlisle, near Pueblo. (Wheeler Expedition) 60° F.	Little Ute, Canon City. (Prof. Leon)
Carbonate of soda	13.50	.....	.....[2]	.....[2]	75.24	130.55	15.42	131.00
Carbonate of lithia	.....	.....	0.38[1]	0.49[1]	.....	.....	.....	trace
Carbonate of lime	102 63	21.96[1]	41.92[1]	36.73[1]	.....	19.89	38.40	38.58
Carbonate of magnesia	82.59	.....	23.31[1]	23 67	.....	11.09	19.52	24.00
Carbonate of iron	1.11	1.99[1]	trace[1]	trace[1]	trace oxide	.....	0.51	trace
Sulphate of potassa	.....	.....	41.35	42.31	8.39	.....	1.20	
Sulphate of soda	52.68	.....	.....	.....	.....	9 69	34.28	20.76
Sulphate of lime	.....	65.70	141.70	138.03	21.64			
Sulphate of magnesia	.....	.....	.....	.....	11.76			
Chloride of sodium	414.58	948.42	1874.51	1869.55	200.76	165.03	19.30	202.33
Chloride of potassa	15.09	.....	.....	.....	.....	32.58		
Chloride of magnesium	.....	21.78	22 53	23.05	.....			
Alumina	.....	.....	trace	trace	.....	0.65		
Silica	1.40	0.40	3.39	3.45	.....	0.92	trace	
Bromide of sodium	.....	.....	0.97	1.41				
Fluoride of calcium	.....	.....	trace	trace				
Evaporation by calcination	.....	.....	.....	.....	2.74			
Organic matter	.....	.....	trace	trace	.....	sulphur[3]	trace	
Total	683.58	1060.25	2150.06	2138.69	320.53	370.40	128.63	416.67
Gases	Car. ac.	.....	.....	.....	Car. ac. Sul. hy.	Car. ac.		

[1] Bicarbonates. [2] Traces of iodide, phosphate, and biborate of sodium. [3] Amount not determined.

III.—Sulphur Waters.

In 100,000 parts of Spring Water are contained:	Middle Park. (Prof. E. J. Mallett, Jr., State School of Mines.) "Red Sulphur." 109½° F.	"Saline." 91° F	"Bath Spring." 117° F.	Porter Spring, North Denver. (Prof. E. J. Mallett, Jr.) 60° F.	Little Chief, Manitou. (Wheeler Expedition.) 43° F.	Liberty Spring No. 1, Wagon Wheel Gap. (Wheeler Expedition.) 150° F.	Pagosa, San Juan. (Wheeler Expedition.) 140° F.
Carbonate of soda	100.45	86.53	38.45	9.97	15.16	69.42	4.70
Carbonate of lithia	.....	.....	.....	.....	trace	trace	0.71
Carbonate of lime	17.29	.....	11.02	17.63	16.20	13.08	59.00
Carbonate of magnesium	11.26	7.10	.....	1.71	13.01	10 91	4.85
Carbonate of iron	.....	trace	.....	2.57[1]	1.30		
Sulphate of potassa	0.86	0.12	2.90	0.52	6.24	trace	7.13
Sulphate of soda	14.54	15.38	43.06	47.23	51.88	23.73	221.66
Chloride of sodium	25.05	.....	22.48	9 14	47.97	29.35	29.25
Chloride of magnesium	.....	.....	.....	1.96			
Sulphide of sodium	.....	.....	.....	3.27			
Alumina	.....	trace	.....	.....[2]			
Silica	.....	.....	.....	.....	2.22	5.73	5.70
Silicate of soda	.....	2.51	.....	1.54			
Lithia	.....	trace					
Organic matter	.....	.....	.....	.....	.....	trace	trace
Total	169.45	111.64	117.91	95.54	213.48	152.12	333.00
Gases	Car. ac.	.....	Car. ac. Silicic ac.	Sul. hy. Car. ac.	Car. ac.	Sul. hy.	Car. ac. Sul. hy.

[1] Oxide of iron.

[2] Trace of ammonia.

IV.—Chalybeate Springs.

In 100,000 parts of Spring Water are contained:	Iron Spring, Steamboat Springs. (State School of Mines.) Cold.	Idaho Hot Springs. (Dr I.G. Pohle New York.) 110° F.	Seltzer, Springdale. (Chas. T. Jackson, State Assayer of Mass.)	River Spring, Estes Park. (Prof. C. F. Chandler, Columbia College, N. Y.) 58° F.	Ranch Spring, Estes Park. (Prof. C. F. Chandler.) 58° F.	Iron Ute, Manitou, (Wheeler Expedition.) 44° F.
Carbonate of soda	.....	52.81	9.37[2]	.....	.....	59 34
Carbonate of lithia	.....	.....	.....	.....	.....	trace
Carbonate of lime	.....	16.32	74.29	2.84[2]	6 89[2]	59.04
Carbonate of magnesia	trace[1]	4.94	1 14[2]	2.01[2]	1.83[2]	14.56
Carbonate of iron	38.40	7.07	6.86[2]	6.66[2]	3.12[2]	5.78
Sulphate of potassa	11.15	.....	.....	0.99	1.09	7.01
Sulphate of soda	39.02	50.34	184 46	.....	.....	30.86
Sulphate of lime	71.86					
Sulphate of magnesia	40.79	32.09				
Chloride of sodium	104.20	7.13	8.51	1.31	1.32	31.59
Chloride of potassium						
Silicate of soda	.....	6.99	6.86			
Alumina	trace	.....	.....	trace	trace	
Silica	.....	.....	.....	0.78	0.99	2.69
Iodide and bromide of sodium	.....	.....	2.23			
Evaporation by calcination	50.58					
Organic matter	3.41	.....	.....	1.79	2.06	
Total	359.41	177.69	293.72	16.38	17.30	210.87
Gases	Sul. hy. Car. ac.	Car. ac.	.....	.....	.....	Car. ac.

[1] Oxide of manganese.

[2] Bicarbonates.

V.—Artesian Wells and Mild Alkaline Waters of favorable combination, chiefly Calcic.

In 100,000 parts of Spring Water are contained:	Windsor Well, Denver. (Chas. A. Gehmann, State School of Mines.) Cold.	Court House Well, Denver. (Gehmann.) Cold.	Bath Spring, Steamboat Springs. (State School of Mines.) 103° F.	Manitou, Manitou. (Wheeler Expedition.) 56° F	Ute Soda, Manitou. (Wheeler Expedition.)	Chalk Creek, Hot Springs, Chalk Creek, Col. (Prof. G. E. Patrick, Lawrence, Kansas.) 130° F.
Carbonate of soda	14.54	27.14	.....	52.26	23.82	
Carbonate of lithia	....	.....	.....	0.21	trace	
Carbonate of lime	.....	2.81	23.50	111.00	40 00	3.35
Carbonate of magnesia	.....	0.55	.....	20.57	6.10	1.08
Carbonate of iron	0.05	0.10	.....	trace	1.40	
Carbonate of potassa	.....	.....	.....	.....	.....	0.23
Sulphate of potassa	.....	.....	trace[3]	13 35	trace	1.09[4]
Sulphate of soda	0.75	.....	9.55	19.76	12.24	10 58
Sulphate of lime	1.58	0.62				
Sulphate of magnesia	0.12[1]	.....	10.43			
Chloride of sodium	.....	24.07	.....	40.95	13 93	
Silicate of soda	.....	.....	.....	.....	.....	4.45
Alumina	.....	.....	trace			
Silica	1.30	1.08	.....	2.01	trace	3.49
Lithia	.....	.....	.....	.....	.....	trace
Evaporation by calcination	.....	.....	4.36			
Organic matter	(18.45)[2]	(56.60)[2]	.....	.....	.....	trace
Total	18.34	56.37	47.84	260.00	97.49	24.27
Gases	.....	.....	Phos. ac. Sil. ac.	Car. ac.	Car. ac.	Car. ac. Oxygen, nitrogen, etc.

[1] Chloride of magnesium. [2] The total solid residue. [3] Potassium. [4] Chloride of potassium.

For purposes of comparison, the foregoing Tables (see pages 233–237) are compiled of analyses of the principal Colorado mineral waters, the ingredients being reduced to a uniform standard—*i. e.*, parts in 100,000 of water. It will be seen from this as yet incomplete list (for there are as many more valuable springs in Colorado as those named) that the State is exceedingly blessed with Nature's healing waters.

The Climate

of Idaho Springs is decidedly stimulating, bracing, and exciting. Like most mountain regions of its altitude, there is an electrical condition of the atmosphere accompanied by high tension and excess of ozone. In these regards, as well as in the greater fickleness of the winds, and the usual lower average temperature, it differs from the climate of the "plains," over 2000 feet below. Otherwise there is a great similarity; that is, as to the uniformly dry atmosphere, the usual gentleness of the wind, and the marked predominance of sunshine over cloudiness. Many residents in the mountains claim that the summers are cooler and the winters warmer than out on "the valley," as the level country along the eastern base of the Rocky Mountains is sometimes called. Since this claim has to be admitted for the summer temperatures, it cannot be so for the winters, because the annual mean for Denver is 49.2° and for Idaho Springs, 45° F. The winters in the mountains may be warmer in proportion to the summers there, but not enough so to more than neutralize the annual difference between Idaho Springs and Denver, of 4.2 degrees.

This is the average of two years' observations at hand, taken by Mr. I. Zeller and Mr. C. E. Barber, of Idaho Springs. While the annual mean for Idaho Springs is four and a half degrees colder than that of Denver, it is only two degrees colder than the average for Manitou.

It is well to remember, when speaking of the average temperatures of such elevated places, that

the rule for computing them, as practised by the Signal Service Bureau, involves an injustice, so to speak, to the day-time records, when people are out of doors, in that the cold 9 P.M. observation is doubled and then added to the cold 7 A.M., and the one warm 2 P.M. observation, and the sum divided by four, to get the daily mean. The greater the elevation above the sea, the more is this inconsistency apparent, especially in mountainous sections, where the towns located in the valleys do not begin to feel the sun's influence till after the morning observation at 7 o'clock. There is not so much discomfort in living in the mountains as the record would indicate.

In considering the climate of Idaho Springs, it is important to note a peculiarity in the environment of the place. The town lies nearly in the centre of a loop, open toward the east, made by a considerable curve of the main range of the Rocky Mountain chain. There is a certain protection from this lofty ridge, though it be twenty miles away, in that many of the strong winds which sweep over the mountains, the southerly and northerly more especially, are deflected to one side or prevented from descending to the valley. Mr. Barber, the observer there, has noted this effect. He has often seen that at the same time the upper clouds would be passing rapidly to the north or south, the moving of the foliage on the mountains would indicate another direction of the wind, while down in the town a light breeze would be blowing in still another direction either east or west—*i. e.*, in the direction of the valley. There is no doubt that the mountains surrounding Idaho Springs have a decided influence in tempering the winds and furnishing a certain stillness of atmosphere which is desirable in very cold weather.

A good way to understand the climate of a given locality is to divide its consideration under the heads of the seasons. The winter and summer variations are thus emphasized and one gets a good general idea of the whole year.

Winter.—December is ushered in by some delightfully pleasant and bracing weather. It is not uncommon to see the uniformly sunny autumns in Colorado, with gentle breezes and very little rains, extended over into winter, even into January, after the reports of storms, blizzards, and snow have been received from different parts of the East. The average records for two winters at Idaho Springs give, on the basis already explained, a winter mean temperature of 29° F.: 7 A.M., 24°; 2 P.M., 39°, and 9 P.M., 26°, with a mean of daily maximum 42°, and of minimum 18°. The precipitation is less than two inches of melted snow, notwithstanding there is an average of about twenty days upon which snow falls. Many of these storms are very light or transient, the sun coming out and shining a half day or more thereafter. The relative humidity of the atmosphere for this season is about 50 per cent.

In December the wind blows at times, but not with great force, and the west wind is apt to prevail in the morning till nine o'clock, when the direction is changed, and the east wind blows very gently till 3 P.M., when the calm of evening comes on. It would be interesting to make comparisons between the winter weather at Idaho Springs and that at Maloja, in the Upper Engadine, where some invalids pass the winter. The difficulty is, the records at hand of the Swiss resort are only for day temperatures—9 A.M., noon, and 3 P.M.—and no exact comparison is possible with our 7 A.M., 2 and 9 P.M. observations. Moreover, even with this advantage for the Maloja Station, the Colorado resort gives higher temperatures for all the averages given, as well as for most of the maximum and minimum data recorded. Yet the Maloja is only 6000 feet above sea level, while Idaho Springs is 1500 feet higher. One finds an explanation of this difference in temperature and rigor of climate in the more northern latitude and greater exposure to sea influences of Maloja, where the limit of tree growth—"timber line"—is at or below the elevation of 8000 feet,

while in the Colorado resort, "timber line" is yet 3500 feet higher up, or 11,000 feet above sea level. The writer suggests that it might be as well to reckon both down from "timber line" and up from sea level, when determining the fitness of a given high altitude resort for invalids. From the foregoing, it would appear that Idaho Springs, though higher in fact than Maloja, yet is not as elevated so far as the sensations of the individual are concerned. Surely those conditions of climate which limit vegetation, even the growth of the hardiest plants, for instance, scrub oak, the quaking aspen, and the mountain pine or spruce, which hug the mountain sides as though they were afraid to venture far into the surrounding atmosphere, must have an analogous influence upon the human organization. This, and other conditions pertaining to the latitude and the inland protection of the Rocky Mountain region from the influence of the ocean, lead the critic to estimate that six thousand feet elevation in Switzerland is equivalent to nearly eight thousand in central Colorado.

Spring.—It is difficult to find a place where spring is the pleasantest part of the year. In the temperate zone it is usually the breaking-up time—a season akin to the annual house-cleaning, which everybody dislikes. In the mountains the winds are fickle and uncertain, the snows are frequent, though very light, the daily variations of temperature considerable, yet little felt, and though it is often cloudy, there is a large preponderance of sunshine; in fact, all the conditions of the weather betoken a variable and elastic state of barometric pressure, such as might be expected in the attenuated atmosphere of the mountains. It has only lately been recognized that there is benefit and not injury in these frequent electric and barometric changes which are common attributes of the most stimulating and tonic extremes of climate, viz.: sea and mountain air.

The purification of the atmosphere and the oft-repeated renewal of the tonic and electrical condi-

tions are processes constantly impressed upon the mind of the inquirer into high altitude effects, whether he explains it on the theory that the mountains are always giving off the electric force engendered nearer the centre of the earth, or whether he sees in the positive electric state of the dry air the facility in the mountains for an easy interchange between this and the negative electric state of the ground.

Notwithstanding this element of change at Idaho Springs, there are interspersed in the weather records for spring, continuous days and even weeks of sunny, beautiful weather, when the day temperature of the air, the freedom from dust or any impurities in the atmosphere, and the little or no snow on the ground to impede mountain-climbing, are all that could be desired.

In spring, while rain or snow at Idaho Springs falls on thirty-five days, there are about thirty clear and forty fair days, and the temperature no longer reaches zero—in fact, even during winter it has not averaged so low four times a year for three years. The total cloudiness and precipitation are about the same as for winter, though less than for the summer season. The average temperature for this season is about the average for the whole year, 45° F., made up of the three observations—7 A.M., 39°; 2 P.M., 56°; 9 P.M., 42.2°. The mean of maximum temperature is 59°, and the minimum 33° F.

This is the time of year when many invalids, who are suited to a higher elevation than Denver, may early seek the greater benefit to be expected from an additional height. It is sometimes better for them not to remain at a level to which they have become fully acclimated and where the good results already enjoyed are in danger of being neutralized by the heat of the approaching summer.

Summer.—The mountains of Colorado are resorted to by many tourists during the summer time. These are not only the invalids from the plains, who have been sojourning in the State, but the new-

comers—"tenderfeet"—from the East, together with many inhabitants of Denver and other towns seeking a whiff of mountain air and to enjoy a rest among the hills. A vacation "in the Rockies" with cool nights and bright sunny days will reinvigorate them for another year's work. It seems to the writer that there is a difference between winter and summer, so far as the sensations of a high climate are concerned, that is equivalent to a difference in elevation above sea level of about 1500 feet—that is, 6000 feet in winter are equivalent to 7500 in summer.

The lower temperature, the drier atmosphere, as to actual weight of vapor in the air, and the more invigorating or electric condition (all of which elevation insures), are also, to a certain extent, the accompaniments of the winter season. Therefore, in Colorado, and happily in contradistinction to the necessities of the climate on the Continent of Europe, the invalid can go up higher instead of down lower when warm weather commences, and thus obtain the cooler, drier, and more stimulating climate he needs. The facilities for camping out in the summer time are unsurpassed by any country, because of the uniform dryness of the air, the porous, sandy condition of the soil, the natural drainage of all sections, and the comparative freedom from the annoyance of insects.

The average for three summers, 1886 to 1888, gives a mean summer temperature of 62.5° F. at Idaho Springs, the mean at the three hours of observation being, 7 A.M., 59°; 2 P.M., 74°; and 9 P.M., 59°. The mean of the maximum is 77.2°, and of the minimum temperature 42.6°. The precipitation is about seven inches of rainfall, and the cloudiness about forty and the relative humidity about fifty per cent. The showers of summer are more apt to be genuine rain-storms, which happily come and go quickly, allay the dust, and are prevented from contributing much moisture to the air because of the quick drainage and the character of the soil.

Autumn.—The fall is the most attractive of all the seasons. The unprecedented number of bright sunny days; the changing foliage with beautiful autumn tints; the absence of dense clouds; the continuance of the unsurpassed sunsets and sunrises, together with the cool nights, when sleep is never more refreshing than after a healthful and invigorating hunt or ramble among the hills—all are but parts of an experience which will never be forgotten by the tourist or invalid who spends an autumn in the Rocky Mountains.

Unfortunately, however, the travelling public, and especially the invalid portion, are a restless set of mortals. No sooner have the autumnal tints begun to appear, or the frosted leaves to fall, than the demands of business call away the tourist, homesickness, or a restless fear of "catching cold," seizes the invalid, and, like a flock of sheep, they all go together and hotels are deserted. Invalids will return to indoor and confining occupations, which they had better have never begun; while others, after loafing about the town till colder weather appears, will catch the "California fever," only to return to Colorado in another year, regretting they had not followed the doctor's advice. Some, however, will systematically continue to live an out-of-door life, which in this climate their experience has proved to be capable of arresting or eradicating their disease.

The population of Colorado has been largely augmented by this class of recuperated invalids. Consumptive patients, as a rule, who have received benefit in the mountains, come down to the plains too soon in the autumn. It would be much better for some of them did they consider their summer's improvement as a stepping-stone or preparation for still greater advances on the road to health.

The records of three autumns, '86 to '88, give a mean autumn temperature of 44° F., taken from the three daily averages, 7 A.M., 38°; 2 P.M., 56°; and 9 P.M., 41°—the means of the daily maximum temperature being 60.4°, and of minimum 33.4°.

The rain falls on only fifteen days, and only four or five days are put down as cloudy, the rest of them being fair or clear. The cloudiness is noted as about thirty-five per cent. of the time, and the average precipitation is between one and a half and two inches of rainfall during the whole season. This is a very good showing, and these are probably as accurate records as can be obtained from the average voluntary observer.

THE WAKEFULNESS OF NEURASTHENIA AS AFFECTED BY SEASIDE RESIDENCE. ITS SUCCESSFUL MANAGEMENT AND CURE.

By W. H. DALY, M.D.,
OF PITTSBURG, PA.

A HOME by the sounding sea, is a pretty poetical fancy that the hearts of all humanity respond to as the flower responds to the sunlight upon its petals. But, to some of the wakeful neurasthenics, probably about fifty per cent., who have sought scuh a home, the effect is disappointing, withering, fraught with hopes chilled and expectations baffled and confused. He, so unfavorably affected, has probably gone to the seaside on the unqualified counsel of a well-meaning but uninformed medical adviser, there expecting to grasp that ethereal and mysterious something that the sea air is, learnedly or otherwise, supposed to possess, and apply it to the healing of his shattered nerves—a healing that it is hoped will send his constitution floating as airily and calmly along as the beautiful and graceful ship at which he gazes on the bosom of the sea. How many disappointments there are in this seeking after some balm that is borne on the wings of the wind, by the ocean side as well as elsewhere, there can never be known ; since hopeful Man, the modern possessor of Pandora's box, likes not to speak of failures, and likes less to admit that the charming seaside which he loves, and which we all love, is not good for everything that his generous heart and hope wish it to be good for; and he bids his suffering brother come to enjoy the "allotropic oxygen," the surf, the soft breezes, the

grand ships, the ocean's roar. But hold! do not invite promiscuously the wakeful neurasthenic to enjoy the ocean's roar; he may enjoy it while, during the day, the other special senses join with the hearing to keep up a unison of interest, but at night when he would sleep then, with eyes closed, the ocean's roar comes to his ears constantly, unremittingly, with the intensifying power of night, as the seething, hissing, and soughing of a restless monster who hisses in his ears the mocking words of the ghost to Macbeth, "Sleep no more," and no thought or pen can do justice to the misery, the agony, of the poor creature who, hour by hour, hopes to sleep, yet lies a victim of thoughts "he cannot banish, forcing their way without the will." Of all the suffering to which unfortunate humanity is subject, none can compare in its horrible character to the persistent insomnia that is made worse by hypnotics, and especially worse by a residence at the seaside. About twenty-two such cases have fallen under my notice while getting a history of concomitant disease of the upper air-passages, for which they consulted me during the past three years, and I have been further interested because of a case in which I was peculiarly concerned, and of whose history I have been fully informed.

It is not my purpose, however, to weary you with the details of cases, but rather to give you the summary of my observations, and earnestly to call your attention to the great need for discrimination in the sending of patients afflicted with insomnia to the seaside; and especially to ask that those of you who are located at seaside resorts, not to allow your honest zeal and enthusiasm for your particular and pet resort to lead you to believe that its air and surroundings will cure anything, from knock-knees to a disposition on the part of children to scratch furniture. The average medical man may make the mistake of sending a neurasthenic patient who has insomnia to the seaside, that would be better at some quiet inland resort, or possibly better

at home, but the experienced medical man at the seaside should, in such a case, have the moral courage to say promptly to such a one, who is not likely to be benefited: This is not the place for you to obtain a physiological cure of your insomnia—the only cure worth having, by the way, and the only one, especially, that a medical man, if so afflicted, should ever undertake to accept, since the perilous practice of purchasing sleep by means of hypnotics is one that in *his* hands must sooner or later lead to destruction, permanent and irreparable, if persisted in, as these means, alas! for his own welfare, are so readily obtainable by him. Now what shall we do for the sufferer from insomnia? If we find his own home must be abandoned owing to business cares that will occupy his mind and attention if he remains, and if we also find the seaside aggravates the wakefulness, then send him inland far enough to get him away from the ocean's roar, while he will still have the tonic effect of the sea air, if by a brief experience in this he should prove to profit by it. But do not persevere in trying to have your patient *overcome* obstacles that he *ought*, and you *ought* to have him, simply to shun, and thereby gain time and comfort for him and hasten his cure. In other words, do not insist too strongly that your patients shall repeatedly and with futility try to adapt their unfortunate conditions to your cast-iron notions of sanitary regimen; but rather adapt your regimen to fit the conditions of the case. This will require no little study on your part, but success will repay the labor of thought in this respect. The patient ought to be encouraged to join quiet friends in quiet amusements, but even this should not be insisted on too strongly. The exercise should be of the quietest kind. I have known eminent neurologists who advised their insomnia patients rather indiscriminately to horseback exercise. Now I have known the excitement and tension due to this exercise, in many cases, to be followed by wakefulness quite surely and certainly and upon repeated trials. Con-

versation or cards after supper, or a pleasant short walk before bedtime, and before retiring the cold douche to the head or the feet as experience shall dictate. In fact, the regimen in insomnia is largely a matter of experience, and not to be adhered to with unreasonable pertinacity. But absolute quiet is one of the essentials for the wooing of sleep, to the wakeful neurasthenic. The walking over the floor above, or some one taking a bath in an adjoining room, or the crowing of a cock, or the gnawing of a mouse, or the rustling of the leaves on the trees beside the window, or the chirping of a cricket, will be sufficient to rivet the attention of the insomnia patient and destroy all vestige of sleep, until from utter exhaustion a half hour of partial oblivion may be obtained long after daylight, when there is a lull or period of repose and quiet between the noises of the night and the coming day of bustle and business.

No talk of business or upon business subjects or enterprises should be indulged in, especially in the after-part of the day ; this is most certainly fatal to the securing of sleep. Nothing irritating should be said by friends, and all subjects that are known to be distasteful to the wakeful patient should be strictly tabooed, as the wakeful neurasthenic is sensitive to an extreme.

Now that we have said briefly what not to do for this class of patients, it is in order for us to ask what shall we do for their comfort and restoration—for what secures the former is certain sooner or later to be followed by the latter. Briefly, it is this: Get along without hypnotics or so-called nerve tonics ; the one hundred and one preparations of the phosphates are a fashionable therapeutic fad, that the manufacturer got up for the benefit of his own pocket, and are about as groundless in therapeutics as the statement of the ostensible German savant, which we have all swallowed, more or less, viz., "Without phosphorus there is no thought"—"Ohne Phosphor keine 'gedank." Now, this is a

most thoughtless statement, and cannot be verified, and the exhibition of the phosphates in any case must act—if they do any good at all, which is questionable—by reason of the other ingredients which render them more or less an elixir and a simple tonic.

The most efficient plan of treatment in the wakeful neurasthenic is a mild alterative and tonic plan, coupled with a close attention to the state of the liver by means of mild mercurial laxatives. I say the liver, but I should also say the stomach, as these two organs are the ones that will reflect their influence upon the brain. A quarter grain calomel at bedtime, accompanied with two drachms, more or less, of fluid extract senna every night, or second or third night as needed, until the yellow stools nearly always present in the neurasthenic are tinged with bile. Keep this condition up and keep up the treatment, being careful not to ptyalize. Use wines or whiskey, when they agree, but in the most moderate quantities, and only in those cases where there is no feeling on the part of the patient of a sense of heat in the head or other evidence of cerebral congestion. In congestive cases, four to six leeches applied to the mastoid region at bedtime, and the wounds allowed to bleed until they stop of themselves, will prove of nearly certain benefit, and very often cure. If one trial of the leeches disappoint, repeat it in a night or two, or even take blood from the arm until cerebral congestion is manifestly relieved, and thus enable the distended cerebral vessels to regain their tone, in order that they may assume the needed anæmic condition required for natural slumber. And while you are keeping all this in view, I may assure you without doubt that the practitioner that attends to the condition of the liver, stomach, and secretions from the alterative standpoint is the one who will restore his patients to health again. We have had, and now have, much of so-called restorative medicine; and we follow the fashions of the day as strictly

and surely in medicine—shame it is to confess it—as do the fair proprietresses of a dozen bonnets or gowns, and we look to a few leaders who set the styles in our therapeutics and we follow them blindly until we stumble across some new fellow who thinks he knows it all, and, like the hounds who have jumped a new hare, we dash after him until we lose the trail, or, rather, lose our patients with a *c*, and sometimes also, lose our patients with a *t*.

Broussais is dead, his doctrines are long since dead and buried; let's look the old fellow up again, and apply some of the hints that he can give as to the physiological doctrine of the liver; put some of the old therapeutics in force with reference to the liver in your wakeful neurasthenics. Do it gently, however, do not try to coax it into action by means of trifling placebos, but put the spur gently to the old laggard and see that its rowel is deftly covered with an amalgam, and this, with rest; coupled with quiet and reasonable time, proper food, and mild tonics, will do more, and do it permanently, than all of the so-called nerve foods and brain foods and other swindles with which the credulous doctor and more credulous patient are commonly at the present day carried along with that hope deferred which always maketh the heart sick.

DISCUSSION.

Dr. S. E. Solly, of Colorado Springs: I have listened with a great deal of interest to Dr. Daly s remarks, and I want to endorse them so far as my experience goes, but I was disappointed that he did not distinguish between those cases which go away and those which stay at home. I know that a great number of neurasthenic patients go to the seaside and they are cured of neurasthenia. We often send patients down from the mountains to sleep; and I know that patients come up from the lowlands to sleep. I believe there is more or less of a dividing line in the temperament of the individual.

Many patients will sleep at sea who do not sleep on the sea-shore nor on the mountains.

Dr. I. H. Platt, of Baltimore: It seems to me it varies with different people in regard to the sea-shore and the mountains. I believe that certain people do not sleep, or sleep badly, provided they lead idle lives. I find a very important element in neurasthenia, is not enough work. I have a large general practice, and have all sorts of cases under my supervision, and I find that people do not generally complain of neurasthenia. I think the reason is that they have to earn their own living. They are porters, servant girls, etc. I do not think one in a hundred complains of neurasthenia. I have often noticed that, in the upper classes, who do suffer with neurasthenia, if I can get them to use their arms instead of their legs, they are relieved. Arm exercise in itself is labor. I try to get them to use chest weights. I think there must be some connection between the arms and the brain. If you can get a person to use his arms up to the point of fatigue he is pretty certain to sleep well. Give a person a sea-voyage on a sailing vessel, and you will not hear much of neurasthenia. Take Atlantic City; they all go to bed early. I have noticed that at high elevations people suffer with neurasthenia. I get those people to go out where they will row and cook and build fires, and they get well. If you can get a woman to sweep and scrub, she will not be troubled with neurasthenia.

Dr. A. N. Bell, of New York: I have but very few words to say. I was very much interested in the paper. Perhaps the more because it was opposite to my conclusions. One patient at least who has been in my care all her life, who is about forty-five years old, gets no relief until she goes to the seaside. This is not the only case. I have had several cases brought to my notice of the benefit of the roaring of the surf.

Dr. E. F. Ingals, of Chicago: I perhaps misunderstood the paper, but I understood Dr. Daly to say that exercise is a bad thing. Perhaps I did misunderstand it. But I cannot fully agree with him in the belief that drugs are of no value in neurasthenia. I know that people will begin to sleep poorly, and finally, they sleep scarcely any. In the beginning, within the first few days, I believe that the judicious administration of drugs is of great value, in some cases.

REST AND EXERCISE IN HEART DISEASE.

By ALFRED L. LOOMIS, M.D., LL.D.,
OF NEW YORK.

Recently physical exercise in the treatment of diseases of the heart has been much discussed, and the statement has been made by distinguished observers that it is a most valuable therapeutic agent in their successful management. Such a statement, however, is misleading and dangerous, unless accompanied by a definite description and classification of those pathological changes in the heart which allow of exercise, and those in which rest is essential to the prolongation of life. I venture to offer a few clinical experiences on this important subject, and to formulate, as far as possible, the rules which now govern me in advising rest or exercise to those suffering with heart affections. Clinical experience makes it evident that while one case of heart disease is benefited by rest, another is benefited by exercise, and the question is constantly coming to us in our management of cardiac cases, What pathological changes in the heart render exercise dangerous and what demand rest?

If we turn to the older writers on heart disease for an answer to this question, it will be found that the plan advised in the treatment of all valvular lesions was to diminish as much as possible the work of the heart, and in most instances absolute rest was insisted upon.

Until quite recently valvular murmurs were the important clinical phenomena in cardiac disease, and decided its diagnosis, prognosis, and treatment. But as our knowledge of cardiac pathology has advanced, murmurs have assumed a secondary place. Within the last few years we have gone a step fur-

ther, and to-day no intelligent observer regards a cardiac murmur as anything more than a sound indicating the seat and character of a valvular lesion. The great problem to be solved in every case is, What is the condition of the heart-muscle and the heart-cavities? We know that so long as full nutrition is maintained in the cardiac walls the heart meets every obstacle to its activity with added force, and only when the walls are weakened do we find the clinical evidences of cardiac insufficiency. To maintain the integrity of the heart-walls and cavities the muscular tissue of the heart must be healthy. The heart-muscle must receive a sufficient supply of healthy arterial blood. The products of muscular waste must be rapidly removed from the body, and the trophic nerve apparatus of the heart must be in a normal state.

Any essential deviation from these normal conditions leads to weakening of the heart-walls, and favors dilatation of its cavities. It is evident that when the physical organism, as well as the heart itself, is healthy, abnormal increased stimulation of the cardiac muscle from any cause results in the production of hypertrophy, while, on the other hand, if the vitality of the organism is below par, and the heart-muscle imperfectly nourished or diseased, it does not respond to the increased stimulation, and instead of becoming hypertrophied, the walls of the heart yield to the intra-ventricular blood pressure, and dilatation of the cardiac cavities is the result. Whenever there is dilatation of the heart-cavities, with weakened heart-walls from any cause, physical exercise is contra-indicated whether valvular lesions exist or not.

It seems hardly necessary to insist upon the importance of absolute rest in the treatment of all acute inflammations of the heart and its appendages, for no one, I think, will claim for a moment that it is safe for a patient with an acute pericarditis, endocarditis, or myocarditis to take even moderate exercise. It is a well-recognized therapeutic prin-

ciple that for the successful management of any one of these acute affections, patients must be kept at rest in bed, freed from all those influences which tend to accelerate the heart's action or increase its force; in fact, the remedial agents on which we rely most in such cases are those which tend to quiet the heart's action and lessen the force and rapidity of the circulation.

The question, therefore, which naturally meets us first in this discussion is, In which chronic valvular lesion (while the heart is still competent, there being as yet no signs of heart insufficiency) shall we advise or permit physical exercise, and in which shall we enjoin rest?

I maintain that no chronic valvular lesion is to be regarded as absolutely contraindicating physical exercise, unless it is associated either with hypertrophy or dilatation of the heart-cavity which it obstructs. The fact that an obstructive or regurgitant murmur is heard at the mitral or aortic orifice is not conclusive evidence that an individual may not without risk engage in the most violent physical exercise; but when a valvular insufficiency at either of these orifices is associated with extensive hypertrophy and dilatation of the left auricle or ventricle, then the question of exercise or rest is to be determined, not so much by the heart condition, as by the age, habits, and general nutrition of the individual. A stenosis or valvular insufficiency after fifty years of age is a very different affair from the same condition at twenty or thirty. Chronic alcoholism and the evidences of general fibrosis render a heart crippled by valvular lesions far less able to resist the strain of physical exercise, than if the same valvular insufficiency exist in one who is free from these general degenerative changes. The two following histories will serve to emphasize these statements:

Case I.—A gentleman, forty-three years of age, with no rheumatic or gouty tendencies, consulted me in June, 1887, for an opinion if it would be safe

for him to join a hunting and fishing excursion to the northern part of Minnesota during the summer. He had been told that he had heart disease, the result of a single attack of acute rheumatism when he was eighteen years of age.

On examining him I found the evidences of extensive mitral insufficiency, with well-marked hypertrophy and dilatation of the left ventricle; his cardiac rhythm was perfect, and he gave no cardiac symptoms. He had led a moderately active life, his habits having been most abstemious, using neither alcohol nor tobacco. I tested him in every possible way, but could not detect the slightest indication of heart insufficiency, and gave him the opinion that it would be perfectly safe for him to take the proposed trip, requesting him to call upon me on his return. During the following November he visited me again, much improved in general physique, and, as he said, stronger than he had been for years. He stated that for three months he had camped out, taking a great amount of physical exercise in rowing and tramping. I could find no change in his heart, except that the apex beat was more forcible than at any previous examination.

Case II.—In May, 1888, a gentleman, forty-six years of age, of very intemperate habits, who had had a severe attack of acute rheumatism at twenty, consulted me for dyspeptic symptoms and pain in the epigastrium. I found on examination the evidences of mitral regurgitation, with well-developed hypertrophy and dilatation of the left ventricle and auricle; he gave no cardiac symptoms, and was not aware that he had a cardiac lesion. I advised him to stop the use of alcohol and tobacco, and to live an out-of-door life in the country during the coming summer.

The following December I saw him again with his attending physician, and found him in a condition of general dropsy, with all the signs of advanced cardiac insufficiency. He reported that when he went into the country the preceding June, he stopped the use of alcohol and tobacco, and immediately began a very active out-of-door life, rowing some days five or six miles without resting; for a time he seemed to improve, but early in Septem-

ber, after rowing a race of two miles, he became short of breath, and had a violent paroxysm of dyspnœa which lasted several hours. After this attack, he found that a short row would bring on a paroxysm of dyspnœa; soon his feet began to swell, and he steadily grew worse, until now he was compelled to assume a sitting posture night and day, and was constantly in a condition of great distress.

The important difference to be noticed in these two cases is in their habits of life. At the time of my first examination, physical signs gave little or no appreciable difference in their cardiac lesions. Both had well-marked mitral regurgitation, with the usual accompanying hypertrophy and dilatation of the left ventricle and auricle; but the abstemious habits of the first gave assurance that the cardiac muscle still retained its normal integrity, while the alcoholic history of the second left little doubt that the cardiac muscle was not in a condition to respond to prolonged or severe intra-ventricular tension, and that under such tension sudden and extensive dilatation of the ventricles occurred, which was never recovered from.

I erred in not appreciating this condition more fully at my first examination, and not guarding my patient against the violent and prolonged physical strain which initiated his heart insufficiency.

The object to be aimed at in the treatment of every case of mitral stenosis is to favor the process of self-adjustment in the heart, by the avoidance of excessive intra-auricular blood-pressure. While gentle and healthful exercise may be of service in relieving hepatic and portal congestion, sudden or prolonged physical exertion sufficient to cause muscular and circulatory exhaustion tends to increase intra-auricular tension, and may lead to extreme dilatation of the auricle and permanent crippling of the cardiac circulation.

The following experience impressed upon me the importance of being very careful about excessive physical exertion in these cases:

Case III.—A few years since a girl, eighteen years of age, was brought to my office by her brother to obtain a permit of admission to the hospital. As she entered my office I noticed that she was very much out of breath. On examination I found the evidences of advanced mitral stenosis. I gave the brother a permit to the hospital on condition that he would take the patient there in a carriage, as there was a strong wind blowing from the east, and she would be compelled to walk a mile against the wind. He promised, but after leaving my office forced his sister to walk. She fell by his side as they entered the hospital gate, and died in a few moments. The autopsy showed an enormously distended left auricle, intense pulmonary hyperæmia with œdema, and a mitral stenosis that would not admit the end of the little finger.

The treatment of mitral insufficiency is directed mainly to the prevention of weakening of the ventricular walls and consecutive dilatation of the ventricular cavities. Muscular exertion, especially such as increases intra-ventricular tension and causes temporary interference with respiration, favors the development of both these dangers. A safe rule is to avoid everything which throws extra strain upon the heart, especially if the evidences of commencing dilatation exist. The amount of exercise which may safely be taken is determined by the special circumstances of each case; in most instances there is little difficulty in deciding this point, for any exertion on the part of the heart which makes itself immediately felt by shortness of breath, with slight irregularity in the force of the radial pulse, cannot be safely indulged in. Whenever, from any cause, there is with a mitral insufficiency a defective, irregular, or in any respect an uncomfortable action of the heart, rest must be insisted upon until the heart regains its rhythmical power; as soon as its rhythmical power is regained, gentle exercise is useful in improving not only the general condition of the patient, but also the contractile power of the heart itself, for muscular movements act as a gentle stimu-

lant to many of the secretions, and thus improve cardiac nutrition. We must, therefore, recognize in mitral insufficiency with an imperfectly compensating heart, that there is a period for rest and a period for exercise; a period when exercise acts favorably by inproving general nutrition, relieving the system of excrementitious products, and furnishing a more abundant supply of oxygen, as well as a period in which it acts unfavorably by calling upon an already overworked heart for still greater power, bringing it nearer the point where forced expenditure overbalances nutritive repair.

The treatment of aortic stenosis and regurgitation has for its object the postponement of tissue degeneration of the heart and arteries by maintaining all the tissues, especially the cardiac muscle, in the highest state of health. Before the period of ventricular incompetency is reached more exercise can safely be indulged in than in mitral disease; in fact, patients with aortic valvular disease should lead active out-of-door lives, and any exercise may be indulged in which does not involve strain or overtaxing the heart; but if the valvular lesions are associated with atheroma of the vessels the individual should lead a quiet life. The indications for rest or exercise in this class of cases are determined by the character of the murmur, the integrity of the heart-muscle, the extent of the ventricular dilatation, and the condition of the arterial walls. A long murmur indicates far less aortic incompetency than a short gushing one, and, as a rule, will admit of much greater physical strain without damage to the heart. Commencing failure of the heart-muscle and non-compensating dilatation of the ventricular cavity, will not, as in mitral disease, be indicated by shortness of breath, but by headache, vertigo, or actual fainting, throbbing of the peripheral vessels, cardiac palpitations, and carotid pulsations. The condition of the arterial walls will be determined by the age, habits, and hereditary tendencies of the patient, and by the appreciable changes in the sur-

face vessels. In any case, therefore, of aortic valvular disease, if the murmur is short and gushing, the cardiac rhythm easily disturbed, the left ventricular area much increased, the cardiac impulse diffused, and the age of the patient, his habits, and his hereditary tendencies, such as to render it probable that extensive arterial degeneration exists, active physical exercise becomes dangerous, and the effects of even moderate exercise must be closely watched.

The important things to be accomplished in the treatment of either primary or secondary cardiac hypertrophy are to diminish, as much as possible, heart strain, to avoid accelerating the circulation of the heart-muscle, so as to enable the heart to compensate perfectly for the defects it has to overcome without exhausting its contractile power. We cannot, and we would not if we could, prevent the compensating hypertrophy which follows obstructions to the normal blood current, which may have their seat either in the heart or bloodvessels; but we may, by forbidding excessive muscular exertion, or other provocatives of increased cardiac action, prevent such hypertrophy from becoming excessive and consequently injurious.

A mode of life must be adopted which will prevent continuous or repeated excitement of the heart, and which, at the same time, will tend to promote the renovation of tissue and maintain the general state of nutrition as well as the vitality of the cardiac muscle, so as to enable it to meet the extra demand which is required of it in compensating for the lesion which has led to its development, and thus delay as long as possible the degenerative changes in muscular fibre which are certain to occur in excessively hypertrophied heart-walls. To this end moderately active exercise may be taken in the open air, but within the limits of slightly quickening the circulation, great care being exercised that occasional or sudden strain shall not be put on the heart by injudicious exercise or violent muscular effort; active prolonged physical exertion with the idea

that it will reduce the volume of an enlarged heart, is calculated to exhaust muscular power, and leads to degeneration of muscular fibre. If a feeling of cardiac oppression, difficult breathing, headache, and vertigo exist, even moderate exercise will be found harmful.

The indications for treatment in cardiac dilatation from any cause are to diminish intraventricular and arterial blood pressure, and relieve venous engorgement: the heart, as far as possible, must be placed at rest, for it is well established that physical exertion increases both cardiac and arterial tension. There is no condition in which cardiac dilatation occurs that active physical exercise is safe, except when the dilatation is secondary to valvular lesions, the integrity of the muscular tissue of the hypertrophied walls being fully maintained, so that the heart fully compensates for both the valvular lesions and the dilatation. The question of exercise or rest in any form of degeneration of the heart-walls is to be determined by the extent and nature of the degeneration, as well as by the constitutional conditions under which it occurs. My experience leads me to the opinion that extensive fibroid change in the cardiac walls, occurring, as it usually does, in those of an hereditary or acquired fibroid diathesis, admits of less intracardiac tension than extensive fatty degeneration of the muscular fibre. Sudden death may occur in such cases as the direct result of sudden and violent exertion. In some instances an extreme dilatation of the ventricular cavities takes place at the time of the physical strain, which is never recovered from, and marks the beginning of a heart insufficiency which terminates life after a few weeks or months of cardiac distress.

The following history emphasizes this statement:

Case IV.—In November, 1888, a gentleman, fifty-six years of age, with a gouty history, consulted me for slight attacks of dyspnœa, which followed exertion, stating that within a few weeks he had become so short of breath going up the stairs

to the elevated railroad, that he was compelled to rest once or twice during the ascent. I found on examination the normal area of precordial dulness much increased, the apex impulse diffused and feeble, the cardiac rhythm irregular in force, and the heart sounds indistinct, but no murmur could be detected. From his history and general condition taken in connection with his heart symptoms, I was quite certain that extensive fibroid changes in the heart-walls existed, and I cautioned him against making violent or prolonged physical exertion.

On the 15th of the following month the elevator in the building where he had his offices having temporarily stopped for repairs, he attempted to walk up four long flights of stairs; when about halfway up the last flight his breathing became so difficult that he sank on the stairs and called for help. He was carried into his office, and after resting a few hours, took a carriage for his house in Fifty-first Street. A few moments after he reached it he died.

The autopsy showed an extremely dilated heart distended with blood, with somewhat thickened ventricular walls, which everywhere showed extensive fibroid changes. At the apex of the left ventricle the muscular tissue had entirely disappeared, and its place was occupied by firmly organized fibrous tissue; there were also evidences of both visceral and parietal interstitial pericarditis. It was evident that the fibroid changes in the heart walls were so extensive in this case that they had not sufficient contractile power to overcome severe intracardiac tension.

In the early stage of fatty degeneration of the heart walls, a moderate degree of vigor may be maintained for a long time, if patients are restricted to an animal diet, and adopt a life of daily systematic out of-door exercise, provided the exercise is never carried to fatigue or to such a degree as to cause dyspnœa. Often such patients after a time will be able to undergo an amount of physical exertion with advantage, which they could not at first safely have attempted, on account of the dyspnœa

and anginal pain which it produced. Muscular exercise under these circumstances is far more likely to be of service in the young than in those past middle life. I have frequently found that in young subjects the signs of heart insufficiency would entirely disappear during a carefully regulated course of gymnastic or pedestrian exercise. But in those advanced in life, atheromatous disease of the aorta and secondary affections of the lungs and liver render even slight physical strain dangerous. If a fatty heart has once become dilated, as is indicated by recurring attacks of anginal pain, syncopal seizures, and paroxysmal dyspnœa, general enfeeblement takes place rapidly, and the most gentle exercise becomes dangerous.

The only heart affections which I have found uniformly benefited by vigorous physical exercise, are fatty infiltration, or, as it is sometimes called, fatty overgrowth of the heart, and weak hearts in anæmic and neurotic subjects.

The treatment of fatty infiltration of the heart differs in no respect from the treatment of general obesity; if the fat can be removed from the muscle of the heart, the organ will regain its normal contractile and resisting power. If the subject is young, the pulse regular, the heart free from valvular lesions, and its cavities not dilated, the aorta healthy, and the kidneys free from disease, the most active exercise may be undertaken without danger and usually with benefit. It is claimed that Oertel's plan of treatment is applicable to all cases of heart disease where there is a disturbance of the hydrostatic balance, but usually there is no disturbance of the hydrostatic balance in heart disease until after failure of compensation, except in those cases where there is general obesity with fatty infiltration of the heart.

The principal and primary pathological factor in obesity is faulty oxidation, and as the heart becomes implicated the power of oxidation is still further lessened. The object of treatment in these

cases is therefore to get rid of the fat by increasing oxidation, and thus improving the nutrition of the heart muscle.

There is no question that the most effective means of accomplishing this is by active physical exercise in the open air, such as is obtained by mountain climbing.

This is no new proposition, for Dr. Stokes, in his work on *Diseases of the Heart* (page 373), states that pedestrian exercise in mountainous countries such as Switzerland and the Highlands of Scotland, will enable patients with fatty hearts to undergo active and prolonged exercise without signs of heart failure, and that the effect of pedestrian exercise is twofold: it not only increases muscular energy and development, but by augmenting the secretions of the skin it assists in conveying off a large quantity of the oily constituents of the system; "and," he adds, "I have seen most remarkable examples of this in young persons who have spent summers walking through the Alps, when during exercise they were under constant perspiration."

No one, I think, will doubt that a life of activity, which favors the oxidation of waste products and accelerates their removal from the body, tends to lessen the work of the heart; but if the heart-muscle is not in a condition to respond to the exercise, dilatation of the right heart must occur, and as its muscle becomes more and more exhausted, systemic capillary obstruction and increased arterial tension follow. When under such circumstances the imperfectly nourished left ventricle is unable longer to meet the demand that is now made upon it, it becomes dilated. Therefore even in a heart that is the seat of fatty infiltration, exercise must be carefully graduated, so that it shall at no time exceed the nutritive supply to the heart muscle. In every case where the heart muscle is not in a condition to respond fully to graduated exercise, the heart work must be reduced to its minimum, until by rest, forced nutrition and alimentation, its con-

tractile power shall be regained. Certainly no case of fatty infiltration should be subjected to Oertel's plan of treatment unless there is unmistakable evidence that the cardiac muscular fibre is healthy. The weak hearts which are so often met in anæmic and neurotic subjects, I have usually found benefited and in many instances cured by judicious exercise and a carefully regulated diet, but the danger of cardiac exhaustion in these cases is very great and must constantly be borne in mind. My studies of the effects of violent physical exercise on the heart convince me that the morbid changes which lead to irreparable cardiac incompetency in a large number of cases commence in the left ventricle, and that their order of development is as follows: It is well established that during violent and prolonged physical exercise the cavity of the left ventricle becomes dilated and its walls hypertrophied to meet the greater demands of the general system for an increased blood-supply; this increase in the ventricular capacity and power gives rise to high arterial tension and increased aortic recoil; as a result degenerative changes are initiated in the walls of the aorta which diminish their elasticity and contractile power; as a consequence the force of the coronary circulation is diminished, and the nutrition of the heart walls interfered with. Excessive dilatation of the left ventricle is now liable to occur during any severe intra-cardiac tension, and the resulting overloading of the pulmonary circulation leads to right ventricular dilatation and finally to insufficiency at the tricuspid orifice. The general venous systemic engorgement which follows marks the advanced stage of cardiac incompetency. Therefore if we advise one who has passed middle life or who has an acquired or hereditary fibrous diathesis to enter upon mountain-climbing, or any other prolonged physical labor, we find when too late that our advice has been followed by irreparable dilatation of the right ventricle.

I would urge that before advising exercise to

patients with cardiac affections, or even to those who have entered upon the degenerative period of life, who furnish none of the usual signs of cardiac disease, we carefully investigate their cardiac resisting power as well as the condition of their general arterial system.

DISCUSSION.

Dr. G. M. Garland, of Boston: It is unnecessary to say that I am extremely delighted with this paper and most heartily endorse all that Professor Loomis has so ably said. There is one point that it has occurred to me to mention, and that is, cases of simple cold in elderly people. In my experience I have noticed this association of symptoms: An elderly person takes a slight cold, and keeps about the house and tries domestic remedies, perhaps. The cold is of no special severity; but, finally, when he has tried for some time for relief, his friends will remark the patient is very short-breathed. It has been my experience almost invariably, when that remark has been made, and I have placed my stethoscope on the heart, to find cardiac insufficiency. The retirement to quieter modes of living, offering the heart opportunity to do its work until the slight extra strain is removed, breaks up the bronchitis of cardiac insuffiency. It has been my rule to insist upon absolute rest, if possible, until the case is under control, at the same time administering such cardiac stimulants as the case would take; but my idea has been absolute rest, and the result has been very gratifying to me.

Dr. R. G. Curtin, of Philadelphia: I have been very much interested in Dr. Loomis's paper, and I would state, in regard to the effect of rest under certain conditions of the heart, that certain cases that have been under my care were so much benefited that I would like to give you my experience. In the first place, I have found that in simple acute palpitation of the heart —that is, a palpitation without any associated disease— giving a simple tonic and massage and rest a few weeks will, perhaps, save the patient's life, while if allowed to get up from bed and lie down at pleasure, he will ultimately die. If that kind of treatment is kept up persistently the cure is almost perfect. Dr. Loomis has

given us some important points in regard to diseases of the heart in old age, especially where the walls of the heart are diseased. If the patient is allowed to rest, it will increase the fatty degeneration. The exercise, of course, has to be graduated to the patient's strength.

Dr. Samuel B. Ward, of Albany: I rise with hesitation to try to add anything to Dr. Loomis's paper. He has made many points that are of interest. In the first place, I think it is the experience of us all that the mere condition of the valves of the heart is of very little importance in comparison with the condition of the walls. I believe with Dr. Loomis that it is exceedingly important to the patient to ascertain for him and endeavor to correct, if possible, any lesion that may occur of the heart wall, whether it may be fatty or fibroid degeneration. As to the main point of rest or exercise, Dr. Loomis has pointed out so plainly the rules that govern us, that there is no more to be said on that. Patient says: "How much shall I do?" My rule has been to say to each one: "As to the violence of the exercise you are to take, I want you to stop just as soon as you feel any discomfort from the exercise you are taking." My rule is always to tell them that any amount of exercise they take which does not fatigue them the next day is aiding them, and any other kind is injurious.

Dr. J. C. Wilson, of Philadelphia: I think that the most important point that Dr. Loomis has made in his admirable address has been that of emphasizing the distinction that is to be made between rest and exercise from the clinical standpoint, and in pointing out the importance in cases of valvular lesions of concentrating our attention and directing our therapeutic methods to the condition of the wall of the heart itself. And this leads me to say one word in reference to the difficulties of diagnosis in certain forms of weak heart. In old age we find *post-mortem* evidence of localized changes. It seems to me too much stress cannot be laid upon cases which seem to be less favorable to treatment by exercise; I say too much stress cannot be laid on the importance of the exercise being from the beginning of the treatment and progressive. Dr. Loomis has distinctly pointed this out in his paper. This I think is one of the objections to any advice that the patient shall take outdoor exercise even within the limits of fatigue. I think to pursue active muscular exercise, after a view of the effect of such exercise on the heart, that we must

invariably insist that it shall be carried on and the result watched by the physician himself from point to point. This leads me to say that it is not the ordinary exercise of life, the ordinary muscular efforts of life, that are necessary to be avoided in that class of cases that do not demand treatment by rest. It is the climbing of four high staircases in a lofty building that has brought about a fatal result; it is the sudden effort made to catch a train, the great and sudden strain by which blood is suddenly backed up into the chambers of the heart, which so often proves fatal in cardiac cases.

DR. LOOMIS: I would like to say, gentlemen, that the impulse which led me to study this subject was the appearance in some of the popular journals of statements from members of the profession—in fact, articles—that the way to cure heart disease was to run up and down stairs three or four times a day, and to exercise in going up mountains, and that anyone with heart disease could get well if they choose to exercise sufficiently. Such statements being contrary to my experience, I went into the investigation to see just how far I had been advising my patients wrong. The more I study it the more I am convinced that anyone with cardiac symptoms, whether there are valvular lesions or not, who suffers from irregularities in the heart action from exercise, when they first begin to exercise should do so very carefully. I think we should watch them until they have reached the point where we can leave them to work up themselves.

There is a condition which, I am certain, the profession are not wide enough awake to, which has caused sudden death in quite a number of the prominent members of our profession, and that is, myocarditis. A man with a gouty history who is growing old too rapidly in his general appearance, whose skin is getting a little shrivelled, whose heart is going pretty fast, and who becomes tired going up stairs, should be careful. I think, as I have said in my paper, it is necessary to take into consideration the age and history of the individual.

INDIVIDUALITY THE BASIS OF RATIONAL CLIMATO-THERAPY.

By G. E. ABBOT, Ph.D., M.D.,
OF BRYN MAWR, PA.

It is of frequent occurrence that known diseases are subjected to imperfectly understood climatic treatment—important conditions and relations being overlooked in superficial advice, or lost in too much generalization. So with the common error of ascribing to climate, disturbances which are incident either to acclimatization, erroneous treatment, or the patient's carelessness. If it were not for these avoidable mistakes of judgment, a systematic differentiation of climates long since might have been made.

The Climato-therapy of to-day deals largely in speculation and experimentation, but a more careful attention to conditions in their relation to results will tend largely to relieve this department of practice of its present uncertainty. The demonstrated or accepted facts of physiology, meteorology, and climatology can be known, and utilized by a common-sense application to the needs of the patient. The treatment of classified disease by classified climate is as brilliant as routine bedside practice; each case must stand alone, and the practitioner learns that success depends upon the ready appreciation of a something called individuality, and the comprehension of its subtle influence in modifying the disease and remedy as observed in the case under treatment.

Believing that the principle of individuation is applicable to all the factors involved in a given case, we define the basis of rational Climato-therapy to be, *the certain knowledge of the individuality of physician, patient, and climate.* This knowledge is intui-

tive and discursive; and the notion of such individuality implies an innate power of discrimination, as well as careful comparative study. Otherwise expressed—the physician, appreciating the personal equation, must realize the importance, and conceive of the reality of the patient and the climate which marks all the others with a difference and constitutes the one under consideration.

The following, purely suggestive in character, may serve to convey approximately an idea of the difficulties attendant upon drawing inferences as to treatment.

Certain rudiments of meteorology and meteorological observations are involved in Climato-therapy. In daily thermometric readings we note that, on mountains the daily maximum comes earlier than on plains or in valleys.—The greatest differences in amplitude are in the strata next the ground.—The air above a convex surface is warmer in winter and at night, it is also cooler in summer and during the day; and the yearly as well as the daily amplitude is less than upon a concave surface.—The daily amplitude on high elevations and in high valleys is often greater than in low-lying plains, depressions, or deep valleys.—Height in itself does not decrease the amplitude.

With small daily changes in absolute, the relative humidity decreases during increasing temperature, and increases during decreasing temperature; *i. e.*, where the daily amplitude is great. The daily change in relative, is more important than that in absolute humidity. In mountain regions, the daily period of the absolute, as well as of the relative humidity is complex; and differs from that of the plains in having a smaller daily amplitude, depending upon the small temperature amplitude and upon moist currents. In elevated valleys, the daily relative humidity amplitude may be greater than in lower valleys, as is the case with the temperature amplitude.

In climatology and climato-therapy it should be remembered that a climate geographically severe, is

rendered relatively mild by topographical and local conditions: that the climate of convex surfaces is influenced more by relative elevation and form of surface, than by absolute height: that the rapidity of vapor formation on mountains is increased by lower pressure, and lessened by the general greater relative humidity, as on plains when the relative amount of vapor is smaller and the barometric pressure is greater; and that low barometer, with high relative humidity, often equals high barometer with low relative humidity in its climatic effects.

Single climatic factors have slight purport; averages mean little unless correctly associated. The first practical question to arise is, The temperature of which air shall be measured? One is of climatological, the other of medical import. Then we should know, not so much the absolute as the relative temperature;—not so much the yearly mean, as the mean winter temperature, and the maximum and minimum of the day and of the month; and also the number of hours of the lowest as well as of the highest temperature in every day in each month.

In regard to rain we require, not the mean or total fall, but the mean monthly fall expressed in percentage of the yearly amount; the quantity of rain and the average number of hours of rain per rainy day. With cloudiness it is necessary to know the mean duration of sunshine, expressed in hours per mean day of the month, and its relation to the possible sunshine. The humidity of a locality is unknown, unless the mean in one of the coldest as well as warmest hours of the day is given; and important as is the actual saturation deficiency, still more so is the sensible deficiency in saturation, *i. e.*, the difference between the actual relative humidity of the air at a given temperature, and that necessary to saturate it, were the temperature 98.5° F., is the sensible relative humidity.

The actual velocity of the wind is not so important as its relative, *i. e.*, its sensible velocity; the saturation deficiency and the velocity of the wind

determining the evaporation. The effect of these factors on a given absolute temperature is equal, according to Smart, to a calculated degree of calm, dry cold, *i. e.*, the sensible temperature.

The benefit accruing from climatic warmth has its limitations. It may retard the progress of diseases of the lungs, but more probably the improvement depends upon conditions in the case of the patient. An equable temperature, with considerable moisture, exerts untoward local and general influences; while changes in humidity or velocity of winds are more trying than variability in temperature. In general, warm, humid climates are sedatives, dry climates stimulants; yet either continued taxes the nervous system. Since "life points to a change in phases of rest and excitement," variations, within certain limits, probably favor the important functions of life more than relative uniformity.

Improvement due to mountain climate comes not from, but in spite of, the rarefied air, and depends upon its aseptic qualities, strong winds, and an atmosphere in which exercise can be taken at all seasons. Improvement due to ocean climate comes from the antiseptic qualities of the air, the smaller difference between day and night, sun and shade, greater protection from chilling influences, and less demand for muscular activity to compensate heat-loss. In the former, the rarefied air expands the lungs, thereby compensating the pressures and facilitating the blood-flow; in the latter, the high pressure accumulates in the lungs the greatly increased amount of oxygen in the air, while the small quantity of carbonic acid present promotes the carbonic acid exhalation. Sea climate increases appetite, bodily weight, excretion of urea and feces, and decreases uric and phosphoric acid excretions; while in mountain climates there is less demand made upon the organs of assimilation, the appetite despite exercise is moderate, the excretion of urine and feces rather decreased, and there is little or no bodily increase. Both climates give equally good results in the same

disease ; and each, in patients with marked differences in degree of vitality—why? Individuality.

The more closely Climato-therapy is studied, the more evident it becomes that successful treatment depends less upon the absolute than upon the relative conditions of climate ; less upon the critically differentiated disease than upon the patient—his physiological resistance, recuperative power, and environment ; less upon the physical factors than upon the individualities of both patient and climate. An opinion in Climato-therapy presupposes an intimate acquaintance with all the factors entering into any one case—of these, Individuality is essentially preëminent.

IN MEMORIAM.

Dr. Thomas F. Rochester, one of the founders of this society, died May 24, 1887, at his home in Buffalo, N. Y. Death has thus removed from the roster of this Association one of its most distinguished names. Though in too feeble health to participate in our meetings, this most eminent physician and successful teacher of medicine, late in life, lent the weight of his influence and the strength of his great reputation to the building up of this new Association. Such a fine mind and character as this man possessed must always leave an impress upon any work undertaken, and it is greatly to the credit of those who first conceived an organization having for its scope so great a field as that which this Association occupies, that men of such distinguished ability were early enlisted in its behalf.

Dr. Rochester was born in the city which bears his name, in 1823, and after a liberal education both in the arts and in medicine, and further broadened in mind by foreign travel and study, located in New York in 1851. Two years later he was called to the chair of the Principles and Practice of Medicine in the University of Buffalo, to succeed the late Dr. Austin Flint. Thenceforward his field of labor was in Buffalo, where, for over thirty years, he taught continuously, and where his fame was not overshadowed by that of any man west of New York. His industry was great, and his capacity for work measured the success, which was not his alone, but was shared by the school of medicine in which he so long and faithfully labored. He received his share of honors in the city of his adoption, and in the State and national councils of his brethren. He contributed in no small degree to the current literature of his time, and, best of all, stamped upon the lives of between four and five thousand students, who listened to his teaching, the impress of his strong character and lofty aims.

F.

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